Journal

J.A.A.N.A.

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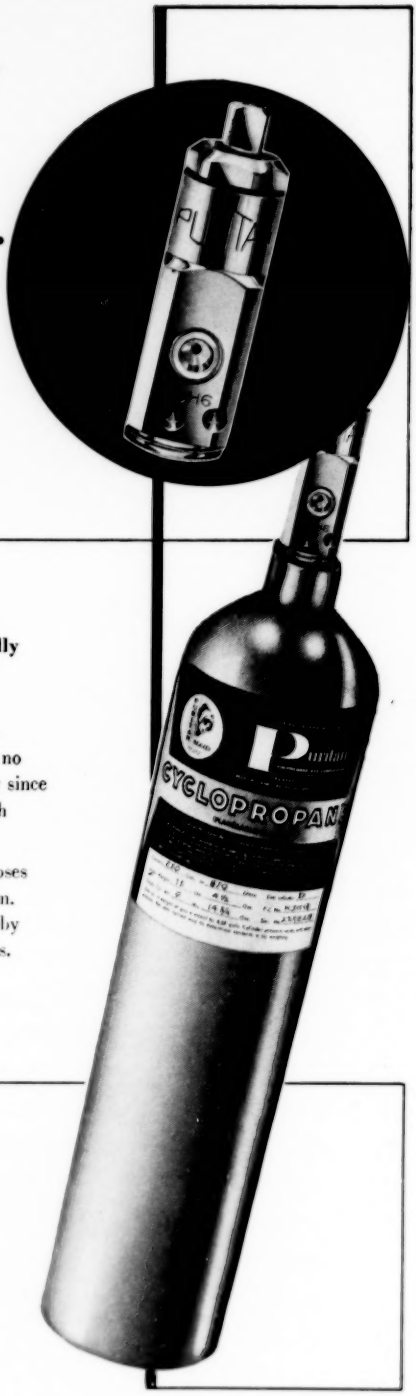

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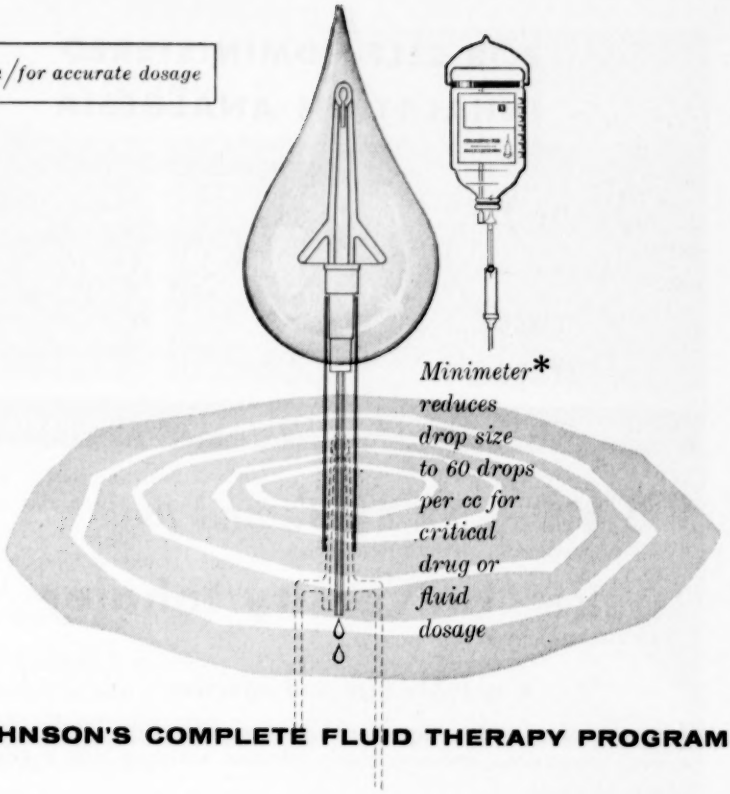

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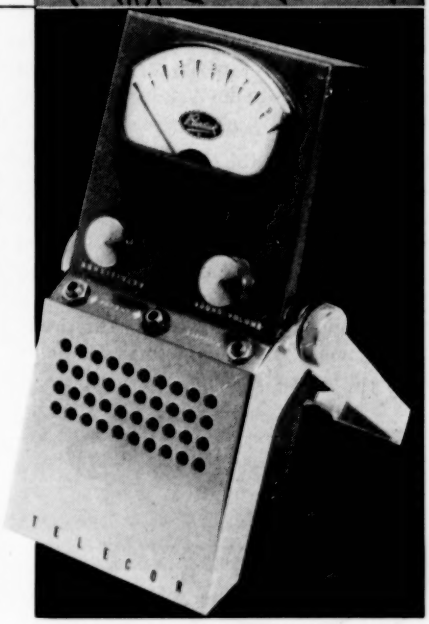

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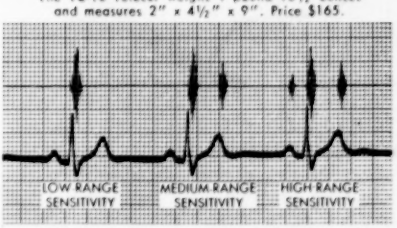

*Based on a design by Dr. John Severinghaus, "Management of Patients During Hypothermia," *Anesthesia and Analgesia*, pg. 24, February 1957

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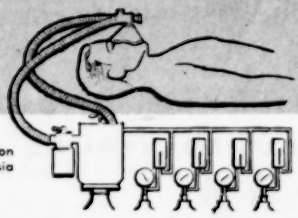

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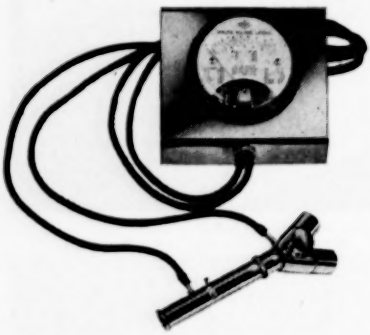

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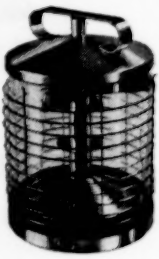

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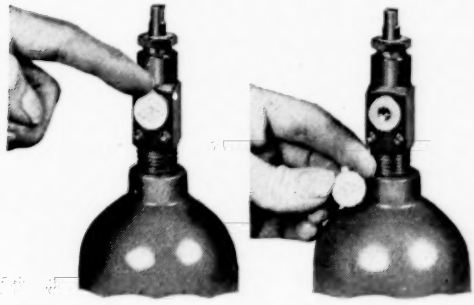

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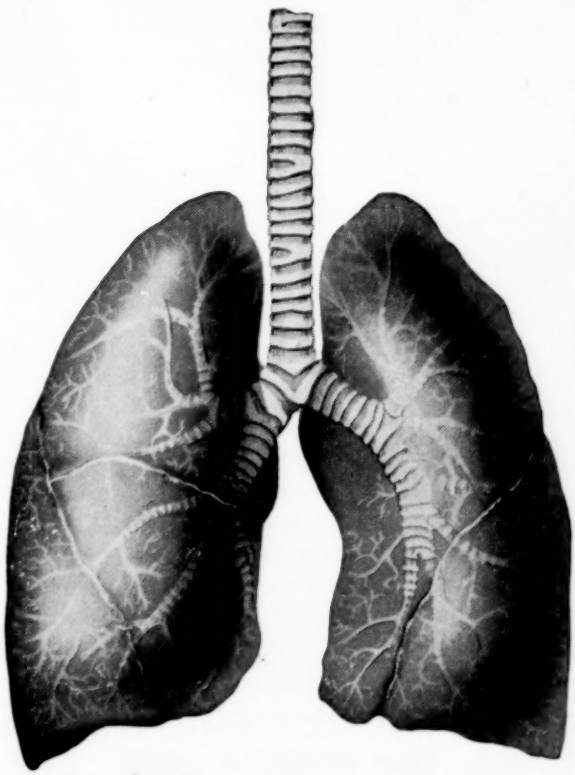

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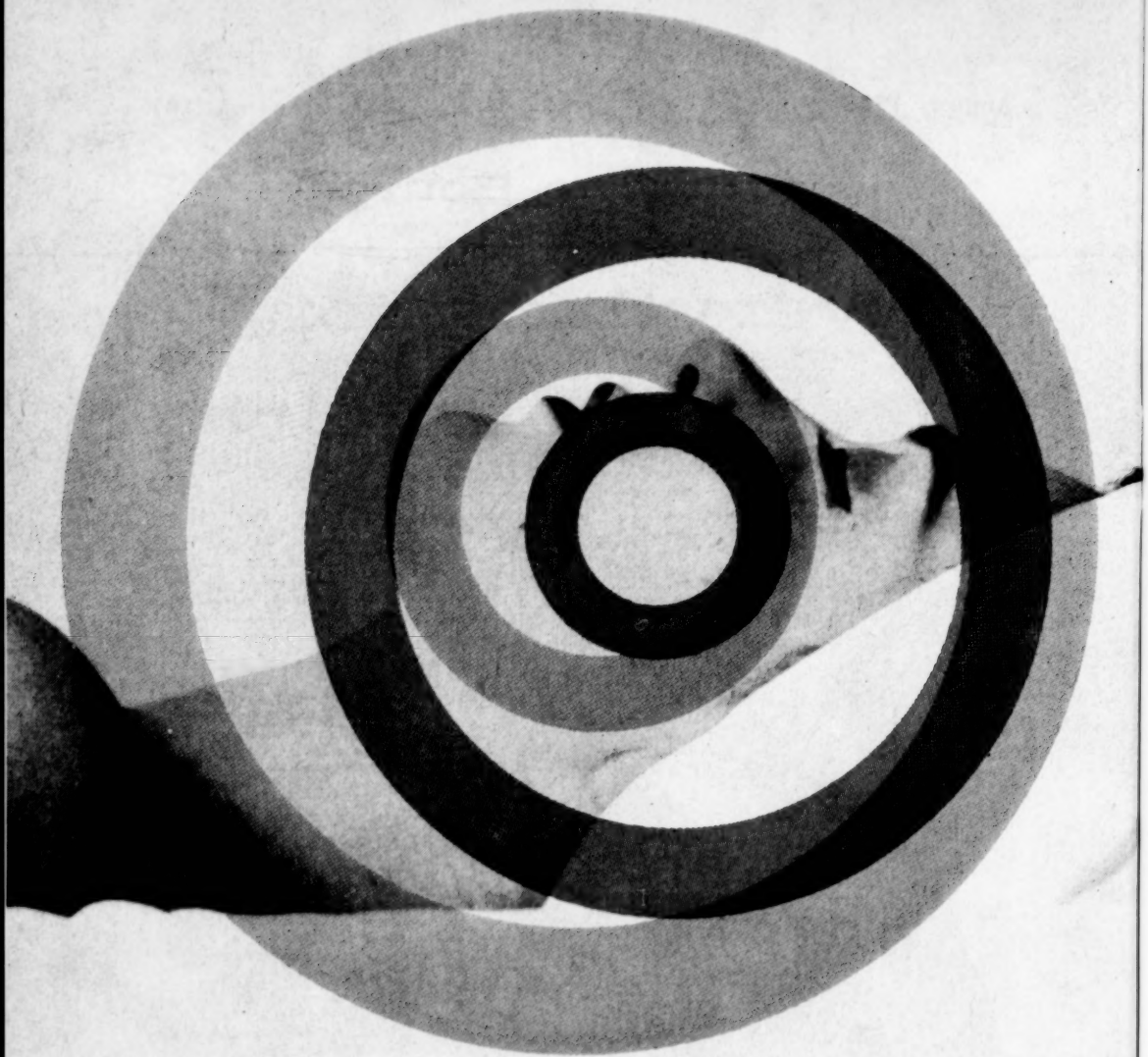

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Anesthesia and Burns

Albert S. Black, Jr., M. D.*

Omaha, Nebraska

A burn is caused by thermal, chemical, electrical means or by radiant energy. It is difficult for us to realize that today, in the United States, the burn death rate is in fourth place among all accidental causes of deaths. Still more vivid is the fact that in our country each year there are over seven thousand deaths from burns and over forty-five per cent of these deaths are in children under six years of age. There are 10 patients hospitalized for every burn death, or 70,000 yearly, occupying 6,000 beds. These figures must be lowered by prophylaxis. Fifty to seventy per cent of the deaths could be prevented by the improved knowledge with respect to early and active treatment of the severely burned patient.

The adequate care and functional rehabilitation of a person who has been severely burned is a task of great surgical magnitude. The surgeon who knows all there is to know about burns and their consequences knows most of what there is to know about surgery. A severe burn stands out at once as the most formidable physiological disaster and surgical tragedy known to medicine. A burn, unlike many other misfortunes of man, is no respector of tissue; kind, size or nature of the organ. All tissues will burn and burn pretty much alike and there is no immunity or resistance. A severe burn is a physiological disaster because the body can compensate for such a major insult only to a point, beyond which death ensues.

In this troubled world of today the fact must be faced that, within a relatively few minutes, any great population center may become crowded with burn casualties from a bombed area. Since many of these unfortunate individuals would have very extensive burns, teams must be alert and aware of the problems presented, as well as the management that must be carried out.

Treatment

The success of burn therapy, as in no other clinical situation, depends upon the sum total of the individual contributions of each member of a surgical team: surgeons, anesthetists and nurses. The prevention and treatment of shock, the preparation of the burn surface for grafting, the outcome of these operations, the relief of pain from frequent necessary dressings, and the maintenance of nutritional requirements, all depend

---

Presented at the Institute for Nurse Anesthetists, Omaha, Nebraska, January 21, 1958.

*Associate Professor of Plastic and Reconstructive Surgery, Creighton University, Omaha, Nebr.

upon team effort. The role of the anesthetist in such surgical teams and his approach to the burn problem is dictated by his peculiar knowledge with respect to all of the problems encountered by the surgeon treating burns.

Our first consideration of a severely burned individual is directed toward the extreme restlessness and anxiety which must be relieved. Accurate evaluation must be made, however, before administering narcotic drugs, that this restlessness and apprehension is the result of pain and not the result of tissue anoxia. Sedative drugs must be used very carefully and their effect accurately measured. It is not unusual for a severely burned individual to have received a generous dose of opiate before he is admitted to the hospital. This must be evaluated and additional medication withheld depending upon the initial dose received and its effect upon the patient.

Once the apprehension, anxiety and restlessness have been ascertained as not due to tissue anoxia, then the administration of morphine, I believe, is indicated. Morphine is better than Demerol® because there is less depression. This should be given intravenously, 8.0 mgm. in 8.0 cc normal salt solution, slowly, rather than subcutaneously or intramuscularly because of the likelihood of the peripheral circulation being slow or inactive, in which event the injection will not relieve the symptoms and additional doses be given. Not until the peripheral circulatory status has been improved will the cumulative effect of the narcotic be evident and then a much greater effect than necessary, even to the danger point, and at a time when it is not needed. Later on, when the peripheral circulatory status has been re-established by effective shock therapy, morphine may be given by the subcutaneous route. Minimal dosage of morphine is indicated because larger amounts do not increase the analgesia but do add to the ever-threatening respiratory depression. If the initial dose of morphine does not seem to have much effect, further intravenous administration should not be given for at least twenty minutes and during this period of waiting it may become evident that the restlessness and apprehension are due to the severity of the injury and not the tissue anoxia.

Occasionally, I have used the intravenous injection of nembutal to control the apprehension and fear induced by the extent and type of injury which is so fear-producing in most individuals with an actual hysteria resulting. Here, again, one must be cautious not to use an overdose or the more serious state of hyperactivity may result. The longer acting barbiturates eliminated by the kidney are best avoided because of the oliguria or actual anuria sometimes developing in the severely burned individual.

Hypoxia

The most significant cause of restlessness, to my mind, is that resulting from hypoxia. Treatment of this should take precedence over all other forms of therapy. Cerebral hypoxia may be caused by a decreased circulatory blood volume or by an impaired respiratory change. Humidified oxygen should be administered promptly to all extensively burned patients by catheter, tent or mask. I believe that everyone is in agreement today that tissue anoxia converts shock from a reversible process to an

irreversible one. Anoxia is also the most common cause of anesthetic complications.

Shock

Awareness of its likelihood, dedication to its recognition and prompt treatment are fundamental to all good anesthetic states. It follows therefore, that the anesthetist is uniquely equipped by training and experience to advise on the treatment of shock following burns. In addition to the correction of the etiological factor, the treatment of shock should be aimed at easing the burden by increasing the available oxygen supply as already indicated, by improving its transport to the tissues and by reducing the oxygen demands of these tissues.

After a severe burn, fluid is lost and red cells are hemolyzed in proportion to the extent and depth of the burn. These losses initiate primary shock which so insidiously develops into secondary shock, and correction by replacement of blood and fluid is urgent if we are to prevent this shock from becoming irreversible. Today I believe that it is generally agreed by all surgeons treating burns, that to replace the lost fluids of severe burns with whole blood, given early, is favored over any other type of replacement. The only reason for not giving whole blood immediately is that it might not be available, in which case, of course, plasma and plasma expanders would have to be employed until whole compatible blood is available. In an extensive burn the resulting massive hemolysis and the loss of hemoglobin reduce the total oxygen capacity of the circulating blood to dangerous levels and present an immediate grave prognosis, especially in the very young and the very old. The hemoglobin loss can be replaced only by the transfusion of whole blood. The use of whole blood, however, should be restricted to the extensive burn. Whole blood is also important two or three weeks after the burn to correct the often present secondary anemia which, if allowed to persist, upsets the general metabolism of the patient and delays or prevents the acceptance of skin grafts.

In estimating the amount of whole blood to be given initially to the severely burned patient, I like to follow the rule of 0.5 cc. to 1.0 cc per kilogram body weight, per per cent of area burned. This amount of blood is estimated for a twenty-four hour period and based upon the administration of Ringer's solution as 1.5 cc. per kilogram body weight per per cent of the area burned. This, in the severe burn, is calculated on a maximum percentage burn of fifty per cent, or 4,000 cc total. Otherwise, the problem accompanying excessive fluid administration will be encountered in the sixty, seventy or eighty per cent burned patient. This total twenty-four hour amount of blood and electrolytic fluids given is divided in half. The first half is given during the first eight hours, the second half given during the remaining hours.

The administration of whole blood during the first eight hours in the severely burned patient is similar to the administration of insulin to the patient in diabetic acidotic coma in which it is difficult to give too much. Rather, the tendency has been, tragically, the administration of too little, too late and secondary shock becomes irreversible. I find a helpful rule is not to allow the hemoglobin or the

pulse rate to go much above 100. If the hemoglobin and the pulse rate climb above 100, then the administration of the parenteral blood and fluids is not rapid enough or is an inadequate amount. Also, if patients are able, they should not be permitted to drink ordinary tap water. Moyer[1] has clearly pointed out the fallacy of allowing ordinary drinking water which will produce water intoxication with its attendant sodium deficiency. Symptoms of nausea, vomiting, restlessness, delirium, muscular twitching and convulsions ensue and will insult the already severely burned patient. In place of this, I like to use Hartman's solution to which has been added an equal amount of water and administered with chips of ice in as large amount as the patient will tolerate. Interestingly enough, this potion, which is unpleasant to our taste, is eagerly consumed by the young and the old burn victims alike.

The immediate need for fluid and blood replacement must not blind any of us to the fact that anoxia, present in severe burn cases, may be initiated by one or more routes in addition to the decrease in the oxygen carrying capacity of the patient's blood. Oxygenation of the tissues depends upon the integrity of several interdependent systems, impairment of any one of which is possible in a burn and will, in turn, affect all others. Each system must be carefully assessed if anoxia is to be relieved.

Respiration

Airway obstruction is a common condition found in the severely burned patient. The mouth, nasal pharynx and larynx should be examined and any foreign material removed. Laryngeal edema is frequently present in burns, especially of a blast or flash nature, and interferes with the maintenance of a normal airway. Indeed, a tracheotomy may be necessary in these persons. Partial obstruction during inspiration will precipitate pulmonary edema in burned patients who already have increased capillary permeability. Limitation of respiratory excursion is frequently seen in the severely burned patient. The actual location of the burn may result in conscious or unconscious effort on the part of the patient to restrict motion of the chest and in the presence of respiratory depression, opiates and barbiturates may add to the inadequate respiratory excursion. Tight pressure bandages about the chest must be loosened.

Oxygen administration is best given, I believe, through an intranasal catheter with holes in its terminal end to disperse the gas and prevent the tube impinging constantly against one spot. This catheter should be secured over the nasal bridge and forehead, and the oxygen cylinder humidifier and connections carefully checked to make certain all are in working condition. Oxygen is delivered through the humidifier, usually at two to three liters a minute, and once every twelve hours the catheter should be removed, cleansed and replaced through the opposite nostril. It is by this attention to detail, that one can be certain that the oxygen is being given as a therapeutic measure, not as following a useless and even harmful routine.

The tendency in recent years has been to simplify the local treatment of extensive burns and place our emphasis upon the measures, some of

which have been noted above, to combat shock and dehydration, to restore the circulating blood volume, to correct protein and electrolyte imbalance, to provide nutritional requirements and to counteract infection.

Handling of Patient

There is no time when gentleness and quiet reassurance is of greater help than in the handling of the severely burned patient. Such handling should be reduced to a minimum and be carried out with accuracy by doctors, anesthetists and nurses trained in these requirements. Handling should not be left to inexperienced personnel who may work for considerable periods of time to the exhaustion of the patient, especially the young, severely burned, frightened child or the aged burn victim. Many times skill and gentleness in handling the burned patient will result in the actual avoidance of any general anesthetic for re-dressings, especially in adults.

Once the decision has been made to use general anesthesia for dressings or surgical procedures (and it is nearly always necessary, I find, for children), the preanesthetic measures are most important. It has been our experience to see burned individuals, especially children, scheduled for surgery in the late morning hours, with excessive preanesthetic barbiturate administration. Conversely insufficient medication may result in actual hysteria based on fear or unskilled handling, or both. These individuals respond to almost any stimulus, whether painful or not, by outbursts of excitement and thrashing about. Also, it is not uncommon to see these patients going to the operating room in the late morning hours having had "nothing by mouth after midnight" after we had spent hours and even days trying to re-establish electrolyte and nutritional balance in the patient. We see patients going to the operating room without food or drink for six, eight or ten hours, and many of these individuals already border on a state of malnutrition and protein deficiency or are in a toxic condition with a tendency toward dehydration, oliguria and alterations in circulating blood volume.

It is easy to see, if multiple dressings are a requirement at several day intervals, an actual state of chronic shock develops over the weeks sometimes required for skin restoration, due only to poor preanesthetic management. The trained anesthetist frequently visits these burned individuals during their hospital stay and upon such repeated visits, establishes rapport with that person which assures close cooperation between the patient and the anesthetist. It offers the anesthetist a chance to discuss, at any time, the advantages or dangers to that particular patient of whatever operation the surgeon may consider advisable.

Anesthesia

The early local treatment of burns, cleansing and application of dressings, really present few problems to the anesthetist. The immediate threat of shock has been relieved before the competent surgeon undertakes such procedures. These operations can be done under nitrous oxide, or low concentration of cyclopropane as a form of "control sedation." Cyclopropane is being used more because of the high oxygen concentration that may be used with it, it is less toxic to the heart than many agents, ease with which depth of anesthesia may be changed and early awakening. So-

dium Pentothal® for adults and ether for children are used by all of us, however, I do think it is important that the anesthesia be an anesthetic and not an analgesic, to avoid aggravating any incipient shock by the production of pain.

Usually, about the second week after a severe burn, the third degree sloughs begin to separate and a decision is made as to the best time for excising any eschar and the application of skin grafts to the denuded areas. Accurate clinical assessment of the patient by the surgeon and other members of the team is essential and they may be assisted, of course, by the clinical laboratory reports as to the optimum time for undertaking resurfacing of the burned areas. The anesthetist's help with regard to this assessment, I believe, is peculiarly adapted inasmuch as he is familiar with the hazards of the various types of anesthetic agents and the selection of one, based upon his knowledge, is usually respected by me above all others. He knows better, too, the capabilities of the surgeon. Atropine is given to all my patients in the dose proportional to the age and weight of the individual. Children tolerate relatively large amounts of atropine as compared to adults.

During the post-burn period, when repeated anesthetics are necessary to permit the dressing and grafting procedures, we know that the basal metabolic rate of these individuals rises and may remain elevated for several months. This must be respected with regard to the nutritional requirement being well above the normal and from the second day on it is my custom for these persons to be placed upon a high protein, high vitamin, high caloric diet. We like to have recovery from the anesthetic agent rapid and uncomplicated if this diet is not to be interfered with. The good anesthetist has the patient awake within minutes of completion of the dressing or operation so that food and liquid may be given within an hour or two of the patient's leaving the recovery room. For children, I like to use nembutal as a rectal suppository for preoperative sedation. I do not believe that this is so important in adults. For many grafting procedures and procedures which require the excision of granulating areas, whole compatible blood transfusions should be given early during the operative session so that replacement of blood loss is accomplished. Once the patient's blood pressure has dropped, very large amounts of blood may be necessary to restore a normotensive state.

It is impossible, in a discussion of this type, to dogmatize on the best anesthetic agent for a burned individual. We have mentioned the increasing uses of cyclopropane in burns. Indeed, the voluminous literature from various areas in the world extolling the virtues of one particular agent or combination of agents bespeaks the fact that no one agent is best. Actually, for the patient's safety the best anesthetic does not depend so much upon the pharmacology of the anesthetic agent as upon the skill and experience of the anesthetist administering it. This also implies a careful preparation of the patient to whatever anesthetic agent and technique is used.

Fortunately, in burns, the requirements of the surgeon are few. All he really wants is a quiet patient and access to the burn areas and the possible donor sites; he does not require

any amount of relaxation and it is possible therefore for the anesthetist to concentrate on the demands of the individual. These include: (1) a rapid, smooth induction free from coughing, struggling or crying which exhausts the adult or child and stimulates the production of possibly obstructive secretions; (2) a high concentration of oxygen to satisfy the increased demands of the burn patient; (3) quiet breathing; (4) a minimal disturbance of metabolic and physiological functions, the restoration of which has been the goal of the surgeon previous to the surgery, and (5) rapid recovery of the patient from the anesthetic agent with early expansion of the lungs and resumption of his high caloric, high vitamin, high protein diet.

Cyclopropane is well suited to meet these demands both in the child and in the adult and may be given with high concentration of oxygen. Its central depressant effect assures quiet breathing and it permits rapid, smooth induction with early return to consciousness.

Intubation

The use of the intratracheal tube, I feel, is imperative when the patient is to be on his abdomen, his side, or to be moved to dress or obtain skin grafts for the burn areas. The burned patient who is under anesthesia for a prolonged period does not tolerate changes in position too well, nor changes in temperature. Body manipulation should be reduced to a minimum inasmuch as persistent hypotension may occur. The surgeon should be encouraged to not repeatedly turn the patient during the operation. Also, marked temperature change from the ward, to the operating room, to the recovery room, especially if one or more are air-conditioned, should be guarded against.

The introduction of an intratracheal tube is dangerous only if done by unskilled hands. Tube sizes and their application are better known to the anesthetist than to me. I do know that intratracheal anesthesia insures an undisturbed airway and makes the surgeon's work much easier to carry out. I have not found that intratracheal anesthesia carried out in a careful manner, predisposes to laryngeal edema to any extent comparable to the danger of not having such a tube in place. I am using intratracheal tubes in children as well as adults when the conditions are such as I have outlined with regard to position and turning and the results have been most satisfactory. In addition, I think intratracheal intubation is extremely useful in those patients with burns involving the face, hands and neck, to provide access of the surgeon to the involved parts, or when the individual who has some respiratory embarrassment, even though minor, cannot be relieved by either manipulation or by the use of an oral airway.

It is not uncommon for the burned patient to become quite cyanotic as soon as he leaves the operating room due to diffusive hypoxia. It can be prevented by using oxygen concentration for several minutes after discontinuing the anesthetic by mask. This cyanosis may also be due to hypotension or a low circulating blood volume with peripheral stasis or shock; in which case, the shock which should not have been permitted to develop, must be corrected as

already outlined and oxygen administered by catheter given for several hours in the ward.

Regional Anesthesia

Local anesthesia, as one per cent procaine or xylocaine, may be useful as an infiltration agent for small procedures. Regional anesthesia may be employed for extremity burns but, in fact, are rarely employed.

Conclusion

Again, may I return to one of my introductory statements, that a burn is a major physiological disaster and requires a team concept. A most valued member of the team is the skilled, conscientious, alert, progressive anesthetist, whose absence from the operating theater would make much, if not all, of our work impossible.

Cardioplegia (Induced Cardiac Arrest) as an Adjunct in Intracardiac Operations

Conrad R. Lam, M.D., F.A.C.S.*

Detroit, Michigan

Since the successful ligation of the patent ductus arteriosus by Dr. Robert Gross in 1938, progress in cardiac surgery has been rapid and dramatic. Actually, the first "heart operations", which were for patent ductus arteriosus, coarctation of the aorta and the tetralogy of Fallot, were not carried out on the heart itself but involved the great vessels outside the pericardium. The first practical intracardiac operation was the transventricular pulmonary valvotomy devised by the London surgeon, Brock. Then came mitral commissurotomy, aortic commissurotomy and closed methods of the repair of interatrial septal defects. In these operations, the surgeon could feel, but not see what he was doing.

The use of general body hypothermia made possible at least two intracardiac operations under direct vision, namely, pulmonary valvotomy and the closure of simple interatrial septal defects. The management of defects requiring more than 5 minutes of cessation of the circulation was not possible until a satisfactory method of extracorporeal oxygenation of blood was available. Lillehei and the group at the University of Minnesota Hospitals were able to repair ventricular septal defects with the use of an anesthetized human being as the "e x t r a corporeal lung".[1] Shortly afterward, they developed a practical oxygenator of the bubble type so that cross circulation with humans was no longer necessary.[2]

Although this method of extracorporeal oxygenation permitted many operations formerly impossible, there was obviously one shortcoming in it which might be eliminated. This was the beating of the heart. During the conventional by-pass of the heart using the pump-oxygenator with the heart beating, there is a continuous flow of blood from the coronary sinus which may obscure the operating field in the ventricle or atrium even though attempts are made to remove the blood by aspiration. If the by-pass is for a considerable period of

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*Surgeon-in-Charge, Division of Thoracic Surgery, Henry Ford Hospital. Presented at the Annual Meeting of the Tri State Assembly of Nurse Anesthetists, Chicago, Illinois, April 29, 1958.

time, it is necessary that the aspirated blood be returned to the system and a certain amount of hemolysis and other trauma to the blood is produced. In the open, beating heart, there is danger of air embolism to important systemic arteries. Finally, it is obvious that some of the surgical procedures can be carried out with greater accuracy if the field is quiet as well as dry.

The possibility that some form of drug-induced cardiac arrest might be of value in intracardiac procedures was investigated in our laboratory in the fall of 1952. Our report[3] to the Michigan Heart Association dated January 15, 1953, contained the following paragraph:

"An Investigation of the Value of Stopping the Heart for Intracardiac Operations: A solution of potassium chloride has been used to cause an immediate cardiac arrest. The token operation is carried out, after which the heart is started by massage, electrical defibrillation, calcium salts and cardiac stimulants as necessary. This technique has been used in operations of four minutes' duration in which the right side of the heart has been opened. The last five consecutive animals in the series have survived for one month or more with no residuals. Operations with the heart asystolic for ten minutes have been done with the aid of cerebral cross transfusion with a donor animal. A study is now in progress to compare the likelihood of recovery of hearts treated in this way with those rendered bloodless by simple vena caval occlusion."

This study went on to include a large number of experimental cardiac arrests in dogs with the nervous system protected by hypothermia rather than cross circulation, and the results were reported in 1955 before the American Association for Thoracic Surgery.[4] Evidence of further progress in the problem was summarized in our report to the Michigan Heart Association dated January 14, 1956:

"Because of the disadvantages of potassium-induced cardiac standstill, which is nearly always complicated with ventricular fibrillation during the period of resuscitation, we have investigated the possibilities of acetylcholine as an "anesthetic agent" for the heart. In acute experiments, this appeared to be the ideal method. With the aorta occluded just distal to the coronary ostia, a solution of acetylcholine was injected into the aorta and thence into the coronary arteries. There was an immediate cessation of the heartbeat. After a variable period of time, heparinized whole blood was perfused through the coronary system and the heartbeat reappeared spontaneously."

Naturally, the reservoir of heparinized blood was soon replaced by a pump-oxygenator which not only supplied an inexhaustible supply of oxygenated blood for the resuscitation of the heart, but also gave protection to the brain and other parts of the body during the period when the heart was out of the circulation. The pump-oxygenator which we first used and continue to use is that of the bubble type devised by Lillehei, DeWall and their associates. Since April 4, 1956, the combination of extracorporeal oxygenation and induced cardiac arrest has been used in the surgical treatment of 156 patients.

The method of inducing cardiac arrest which we have adopted is as follows: After the introduction of the cannulas into the subclavian artery

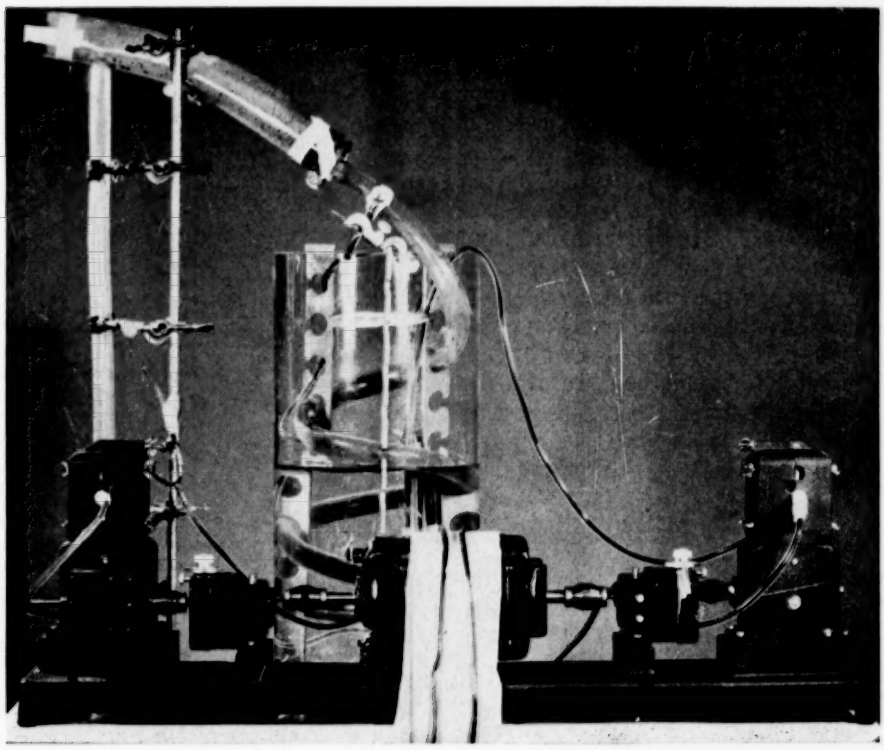

Fig. 1
Pump-Oxygenator of the type devised by the group at the University of Minnesota. Blood is pumped from the vena cavas into the vertical oxygenating tube on the left; bubbles are removed in the larger inclined tube and the blood collects in the helix in the water bath. It then passes through a filter and is pumped into the subclavian artery through the head of the Sigmamotor pump on the right.

and the two vena cavas, they are attached to the pump-oxygenator and the pump is started. The snares about the caval cannulas are tightened and the level of the blood in the helix of the oxygenator is observed to see if inflow and outflow rates are equal. A non-crushing clamp is placed across both the aorta and pulmonary artery. Acetylcholine in the amount of 10 mg. per kilogram of body weight is injected into the aorta proximal to the clamp. The heart stops when about two-thirds of the solution has been injected but the injection is continued until the calculated dose has been given. Although apparently in arrest, the heart beats when the ventricular well is stimulated mechanically. There is usually no activity during the suturing of ventricular septal defects or operations on the heart valves. No additional acetylcholine is given for the sporadic beats which arise as a result of this direct stimulation.

Resuscitation of the heart is remarkably simple. The clamp is removed from the aorta permitting the blood from the oxygenator to flow into the coronary arteries. The acetylcholine is washed out of the coronary vessels and escapes into the right auricle through the coronary sinus. It then escapes through the atrial or ventricular incision or if

such an incision is not present (as would be the case during an operation on an aortic valve), a path of egress must be provided. A catheter inserted through a small atriotomy is satisfactory. The suturing of the cardiotomy incision is begun as soon as the aortic clamp is removed, and usually a good heart beat is present by the time the incision is closed. If there is delay in the appearance of an effective beat, the final sutures in the cardiotomy incision are also delayed, so that the recuperating heart does not have to work against resistance.

Clinical Experiences

Of the 156 operations in which induced cardiac arrest has been used, one hundred and one were for the repair of ventricular septal defects in one hundred patients (one patient had a second operation for the repair of a recurrence of the defect). The technical details of these operations have been reported in several articles in surgical journals.[6-9] Induced cardiac arrest has been especially valuable in the repair of ventricular septal defects. In the perfectly dry and quiet field the sutures can be placed with great accuracy.

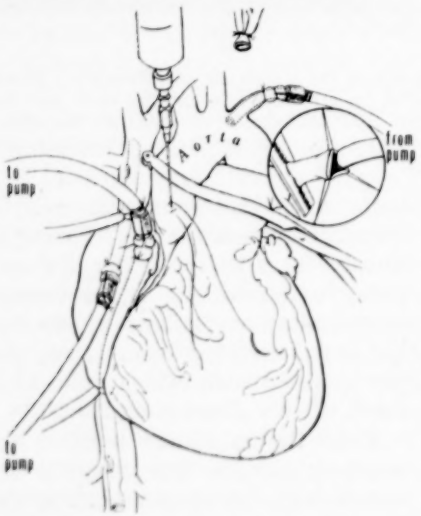

Diagram of cannulations for the cardiac by-pass with the pump-oxygenator and method of producing cardiac arrest by the injection of acetylcholine into the clamped aorta. (This figure and those following from Surgery 43:7, 1958).

Fig. 2

Details of typical closure of interventricular septal defect with the aid of induced cardiac arrest. The sutures are passed through and tied over a pledget of compressed Ivalon sponge.

Fig. 3

Restoration of the heart beat has not been a problem in any of the patients. Ventricular fibrillation has occurred infrequently (about 5 per cent incidence), and it has always been converted with one electrical countershock.

The total mortality in the 101 operations for repair of interventricular septal defect has been 25 per cent (twenty-five cases). There were three deaths in thirty-two patients over the age of three years, and one

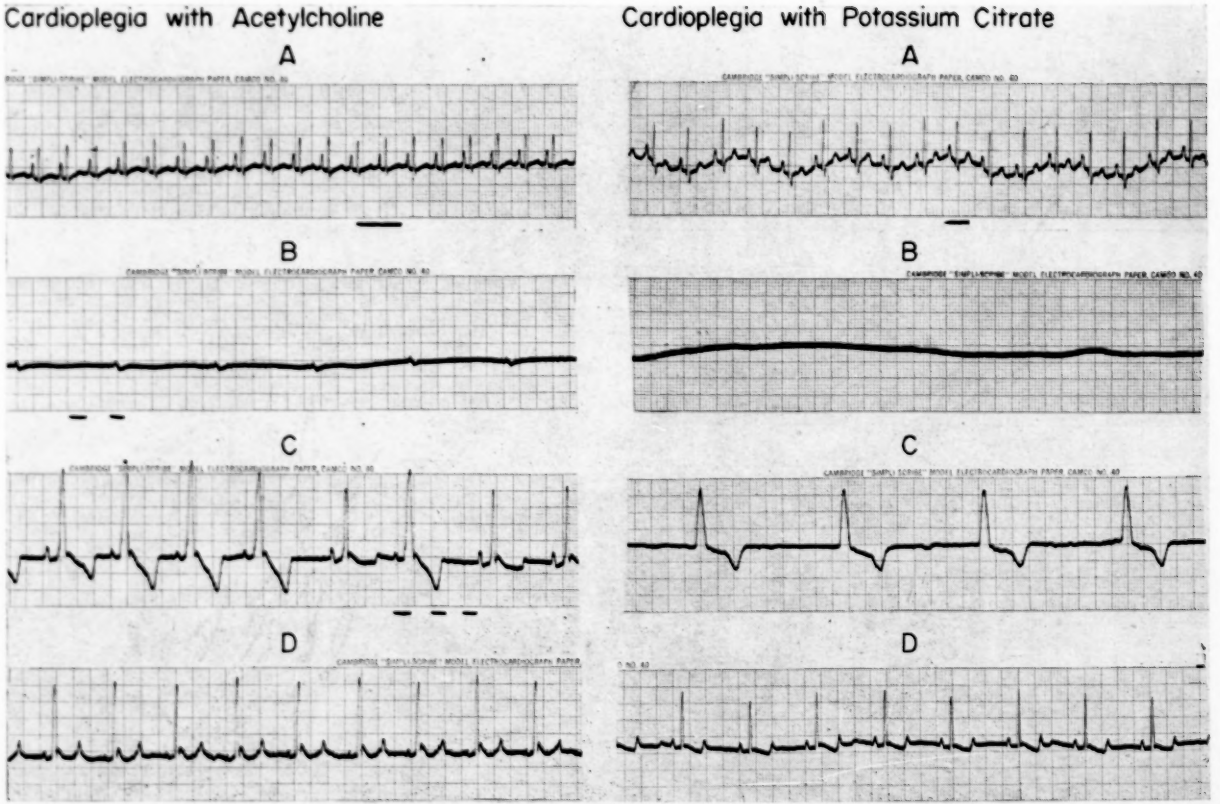

Fig. 4

Comparison of electrocardiographic tracings in animals with cardioplegia produced with acetylcholine and with potassium citrate. A, Normal tracing. B, During arrest. C, Three minutes after removal of aortic clamp and beginning of coronary perfusion with oxygenated blood. D, Tracings taken after full recovery of the hearts. Note that atrial activity persisted in the heart arrested with acetylcholine and that recovery was more rapid.

of these was atypical, with marked underdevelopment of the right ventrical.

Induced cardiac arrest was used in a miscellaneous group of fifty-five cases. This list included eight instances of complicated interatrial septal defects of the type commonly called atrioventricularis communis. All but one of these survived the immediate operative procedure, but there were two late deaths with evidence of recurrence of the defect. A prosthesis should have been used in these cases which developed recurrence.

Successful operations have been carried out for the removal of a myxoma of the right auricle, the excision of isolated infundibular stenosis of the right ventricle, anomalous insertion of the veins of the right lung without interatrial septal defect and the repair of triatrial heart (heart with two left atria and one right atrium).

Operations for the cure of aortic stenosis, mitral insufficiency, and the excision of aneurysms of the arch of the aorta have been done with induced cardiac arrest, but with far less encouraging results, mainly due to the hopeless type of pathologic states encountered.

SUMMARY

Induced cardiac arrest is a valuable adjunct to extracorporeal oxygenation in intracardiac operations. The cardioplegic drug acetylcholine was shown to be very efficient in the experimental laboratory, and it has been used in 156 human operations with satisfaction.

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Anesthesia and the Open Chest

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Of all the fields of medicine, thoracic surgery has made the greatest advances in the past few years, particularly in the category of cardiovascular operations. However, the manual dexterity of surgeons has not increased, and the cerebration of investigators seems no more profound than in the past, so one must look elsewhere for the explanation of this improvement in the surgical treatment of diseases of the contents of the thorax.

Most forms of human endeavor advance through progress in allied fields, and chest surgery is no exception. Chest surgeons owe a great debt to blood banks, to antibiotics, and greatest of all, to anesthesiology.

Every chest surgeon should have a household shrine devoted to the endotracheal tube, because the whole structure of thoracic surgery depends upon this simple device by which the physical factors that govern the entrance of oxygen into the lungs can be reversed, so that positive external pressure can drive the gases, instead of depending on negative intrathoracic pressure to draw the gases into the lung.

From time to time I have an opportunity to speak to student nurses about chest surgery, and I always ask at the onset, one question, "What makes thoracic surgery different from some other branches of the specialty?" Last month one young lady appealed greatly to me when she said, "You have to know what you're doing when you go into the chest." Some of my general surgery friends take a dim view of this story when I relate it. The answer we want, of course, is that operations in the chest are done on organs whose continued function is vital to the patient, and whose normal function depends on an undamaged thorax. We must, therefore, in the open chest operation continually keep in mind the deficit we are creating in the normal physiological mechanism and make provisions for overcoming the burdens we place on the patient.

Almost all of the services in the Memphis area use nurse anesthetists for the vast majority of surgical cases, with access to anesthesiologists for consultation and assistance in case the occasion arises. The procedure that we use involves premedication rather lightly with an opiate and a barbiturate, and always the use of atropine to decrease secretions and to minimize the effects of vagal stimulation during manipulation about the airway.

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Presented at the Mid-South Post Graduate Nurse Anesthetists' Assembly, Memphis, Tennessee, February 13, 1958.

Induction

Induction is achieved with rather a small amount of 5% solution of Pentothal® during which thorough ventilation of the patient's respiratory tract is essential. Drip administration of a 1% Anectine® solution is started and anesthesia continued with oxygen, and the gradual addition of ether vapor. The Anectine® now can be discontinued. The patient is positioned on the table, and anesthesia stabilized, and only then does the surgeon leave the room to scrub.

Maintenance of Anesthesia

During operation, ventilation is assisted by the anesthetist, and controlled respiration used if it is necessary, but preferably the patient's own respiratory rhythm is maintained, and his ventilation assisted by the anesthetist. This sort of routine gives no difficulty in the surgical maneuvers and keeps one more reflex to help protect the patient. Light anesthesia is important. Little relaxation of muscles is needed, and deep planes of anesthesia p r o l o n g recovery. Rhythmic and deep ventilation of the lungs is of utmost importance during the entire procedure. Mere insufflation of oxygen will keep a normal patient pink, but the up and down motion of the lungs is necessary to get rid of carbon dioxide. The accumulation of CO_2 and rapid changes in the blood levels of CO_2 predispose to cardiac standstill or fibrillation. A pink patient, with lungs moving up and down is in little or no danger of cardiac arrest.

The airway must be kept open by periodic suctioning, but suction should be brief and should be followed by a period of hyperventilation since a suction in the main bronchus rapidly reduces the oxygen pressure in the alveoli and leads quickly to cyanosis.

Circulation

In the safe conduct of a patient through open chest surgery, the fundamentals are rather simple. We have touched on oxygenation and ventilation which are so necessary for the well being of the patient. The cardiovascular status during intrathoracic surgery is of equal importance. The integrity of the heart is protected by oxygenation and the whole system depends on an adequate volume of circulating blood. The maintenance of the blood volume is, therefore, an important joint responsibility of the surgical team.

Two good large intravenous needles need, usually, to be in place and blood needs to be replaced as it is lost. At the West Tennessee Tuberculosis Hospital, we have for years calculated the amount of blood lost at surgery by weighing the surgical sponges, and we can testify that it is an extremely variable amount and difficult to estimate correctly. It costs about 300 cc's of blood to get into and out of the average chest, through a postero-lateral thoracotomy incision, and various pulmonary resections have resulted in a measured blood loss up to 4900 cc. In a comprehensive study reported several years ago, the incidence of surgical shock was 6% in a group of 196 operations in which blood loss was weighed and replaced, while shock occurred in 18.5% of 216 similar operations performed during the same period when blood loss was estimated and replaced by transfusion on the basis of the estimates. Slightly more blood was given to those in whom

blood loss was estimated, so this does not account for the increased incidence of surgical shock. It seems that the timing of administration of the blood is important. It is essential to replace blood as it is lost, and so to maintain a good circulating volume, rather than to wait until signs of shock appear and then give blood to correct the condition.

At the conclusion of the operation we like our patients to be coughing. Ventilation and suction again is carried out, and the endotracheal tube removed. In operations for diseases of the heart or great vessels, even lighter anesthesia and much more scrupulous attention to blood volume is essential than is necessary for operations on the lung.

Esophagoscopy

There is one other procedure that should be mentioned briefly—esophagoscopy. Under endotracheal control this is a simple, leisurely affair. A little different technic is needed in passage of the scope when an endotracheal tube is in place, but the ability to get in and out of the esophagus and to take all the necessary time to visualize lesions, compensates for this slight disadvantage.

Aids to Good Results

Ether vapor is the drug of choice, but other agents may be useful, particularly cyclopropane if respiration seems jerky. A little increased pressure in the system may also help and a gauge to measure this pressure is essential. If the heart beat seems to be deteriorating, or if bradycardia develops, a repeat of the atropine together with hyperventilation of the chest may be quite beneficial. If blood pressure falls, especially in a debilitated patient and if this fall is obviously unrelated to blood loss, then pressor agents such as Levophed® may be used and will often permit safe completion of the operation.

Probably the most important point has been saved for the last. Absolute teamwork is essential, and confidence between members of the surgical group. The anesthetist must know what is going on in the chest, and must never leave the head of the patient. The surgeons need to know immediately of any change in the condition of the patient, and owes it to the patient to do all in his power to facilitate the work of the anesthetist.

A Comparative Study of Dipipanone Hydrochloride, Dihydrocodeine, and Win 14,098-2B with Meperidine*

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Method

All drugs were administered to patients in the immediate postoperative period in the recovery room of Jefferson Medical College Hospital. The indication for an analgesic in all cases was the complaint by the patient of pain, which was considered by the observers to be in the moderate to severe category. Patients with severe cardiac, pulmonary, renal or central nervous system disease or those manifesting postoperative complications such as shock were eliminated from this study. Obviously over-emotional individuals were also excluded. Children were excluded because of insufficient knowledge of the dosages of one of the drugs studied.

The drugs were administered by the double blind technique (unknown to the patient and observer) using a code (A, B, C, D) which was frequently changed. Individuals were categorized into four classes on basis of type of operation and its expected degree of pain. The drugs were given in random sequence and equal distribution within each class of operations.

Equi-analgesic dosages were calculated on basis of previous studies (1, 2, 3, 4), and were given on a per weight basis:

Dipipanone — 20 mg/70 kilo body weight
Win 14,098-2B — 5 mg/70 kilo body weight
Meperidine — 75 mg/70 kilo body weight
Dihydrocodeine — 30 mg/70 kilo body weight

Because postanesthetic patients were used, it was felt a dosage of Meperidine greater than 75 mg/70 kilo body weight was contraindicated. Drugs were given intramusculary by the observers. Only one dosage was given to each patient, and if relief was not obtained within one hour, the study was concluded and a known analgesic was given.

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* Win 14, 098-2B (Ethyl-4-phenyl-1-[3-(Phenylamino)propyl] piperidine-4-carboxylate dihydrochloride) supplied by Winthrop Laboratories, Inc.· Dihydrocodeine supplied by Knoll Pharmaceutical Co.; Dipipanone Hydrochloride supplied by Burroughs Wellcome & Co. (U. S. A.) Inc.

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CHART I

CLASS I
Nephrolithotomy
Nephrectomy
Hiatal Hernia Repair
Thoracotomy
Bowel Resection
Gastrectomy

CLASS II
Laminectomy and Fusions
Hysterectomy
Caesarean Section
Suprapubic Prostatectomy
Radical Mastectomy
Cholecystectomy
Lumbar Sympathectomy

CLASS III
Herniorrhaphy
Thyroidectomy
Colporrhaphy
Exploratory Laparotomy
Appendectomy

CLASS IV
Ureteral Catheterization
Saphenous Ligation
Incision and Drainage Breast Abscess
Fissurectomy
Breast Biopsy
Open Reduction of Fractures

Three drugs — dipipanone hydrochloride, dihydrocodeine and Win 14,098-2B — were compared with meperidine in respect to potency as analgesics in the immediate postoperative period, and in relation to the occurrence of three side effects: Nausea, vomiting and sedation.

All observations were made by two of the authors throughout the study working together and separately.

The following data were collected on each patient:

1. Name, age and sex
2. Drug and dosage
3. Operation (duration, anesthesia, physical status)
4. Onset of drug action
5. Duration of action
6. Analgesic effect
   0 — pain bad as before
   1 — pain little better than before
   2 — pain relieved to tolerable
   3 — no pain
7. Pulse, respirations and blood pressure
8. Side effects

No attempt was made to analyze the data in regard to age, sex, type of anesthesia administered, length of operation or physical status. Analgesic potency was compared in regard to onset, duration and degree of effect. Duration of analgesia was based on the time at which another analgesic was required for relief of pain; side effects were stated and their incidence was recorded in the analysis.

Results

Analysis of the results according to the individual classes of operation based upon expected degree of pain, showed no significant differences from the cumulative results of all cases. Class distinction, therefore, will be disregarded and only the cumulative results discussed.

Onset

Using 0-9 minutes as the optimum period of time for onset, it was found that Meperidine was most rapid with 27 out of 30 cases obtaining some relief in this time period. Dipipanone and Win 14, 098-2B were less rapid with 16 of 29 cases and 15 of 28 cases, respectively, having onset of relief in this period.

	Drugs	Meperidine HCl. 75 mg/70 kilo.	Dihydrocodeine 30 mg/70 kilo.	Win. 14, 098-2B 5 mg/70 kilo.	Dipipanone HCl. 20 mg/70 kilo.
ONSET (Minutes)	0-9	27	9	15	16
	10-19	2	6	6	9
	20-29	1	5	3	
	30 & over		9	4	4
DURATION (Hours)	0-1	0	9	6	2
	1-2	5	4	9	2
	2-3	2	2	3	1
	3-4	6	7	3	3
	4 & over	17	7	7	19
EFFECT	0		8	3	3
	1	4	8	13	5
	2	26	12	11	17
	3		1	1	1
	Nausea	2	5		1
	Vomiting		1		
	Sedation	25	12	16	22
	TOTAL CASES	30	29	28	29

Duration

Using four hours or more as optimum duration, Meperidine and Dipipanone were essentially equivalent. Neither Win 14,098-2B nor Dihydrocodeine approached these drugs in duration of effect.

Effect

The optimum gradations used were 2 and 3 (pain relieved to tolerable, and no pain). Results showed 25 out of 30 cases receiving Meperidine, and 21 of 29 cases receiving Dipipanone were in this category. The other drugs were obviously not as effective. Dihydrocodeine showed 8 out of 29 cases to be in the zero or no relief category.

Side Effects

A detailed analysis of blood pressure, pulse, and respirations was not made because postanesthetic patients were used. These signs, however, were recorded and no significant changes were noted. The most common side effects encountered were nausea, vomiting, and sedation. Occasionally a complaint of dizziness was made by patients receiving Meperidine and Dipipanone. Dihydrocodeine showed a greater incidence of nausea but this finding must be considered in respect to the occurrence of nausea in postanesthetic patients. Sedation was found to be most common in patients who had received either Meperidine or Dipipanone with little difference between these two drugs. Dihydrocodeine had significantly less sedative effect than the former two drugs.

Summary and Conclusions

1. An attempt has been made to compare equi-analgesic dosage of Dipipanone Hydrochloride, Dihydrocodeine, and Win 14, 098-2B with Meperidine Hydrochloride in regard to their analgesic power and side effects in postoperative patients.
2. An analysis of 116 cases showed:
   a. Meperidine was most rapid in onset.
   b. Meperidine and Dipipanone were similar in duration.
   c. Meperidine and Dipipanone were significantly more effective than Win 14, 098-2B and Dihydrocodeine.
   d. Dihydrocodeine has significantly less sedative effect than Meperidine and Dipipanone.

Since the side effects, at dosages used, were less for Dihydrocodeine and Win 14, 098-2B further studies with larger dosages are necessary to evaluate more accurately the analgesic powers of these drugs. The effect on blood pressure, pulse and respiration should also be studied using healthy volunteers to eliminate the variables of the postoperative period.

Acknowledgement

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Geriatric Anesthesia

William E. Trotti, M.D.*

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Many years ago Benjamin Franklin made the observation that, "Nothing in this world is certain, but death and taxes". In the past two decades death has become more remote, while the pressure of taxes has abated not one jot. The world's population today stands at approximately two and a half billion people. It is estimated that in the next forty years this figure will be doubled. This startling fact is the result of an increase in the number of old people, for the birth rate of the world remains approximately static. In the few minutes that I have to speak with you, I do not propose a cursory discussion of the subject of geriatric anesthesia. I will attempt to cover only those segments of geriatric anesthesia that I think will be of interest to you as nurses. I would like to divide my discussion into three parts. First, the physiologic changes we find in the geriatric patient; secondly, problems of premedication in the old individual; and thirdly, I would like to discuss some of the controversial new procedures and concepts.

Physiologic Changes

First of all, let us consider the external changes seen in the elderly individual. The increased pigmentation, dryness and wrinkling of the skin are all familiar sights to us. There are many other external changes which we observe in old individuals; but, the one that is of most interest to us is the edentulous state we find in many of our old people. The edentulous state creates a number of difficulties for us as anesthetists. The major problem, of course, is the problem of obtaining a proper fit with the mask. The so-called "cutout" mask is of help in many of these cases. We may also pack the cheeks with damp gauze, or it may be necessary to intubate the patient in order to maintain a proper fit. The recession of the gums which the edentulous patient suffers predisposes to early obstruction during induction. Upon trying to place an oropharyngeal airway, it is not uncommon to find the jaws clamped tightly shut. A very soft nasopharyngeal airway may provide an airway as well as facilitating the additional necessary anesthesia for placing the oropharyngeal airway in an atraumatic fashion. For this purpose, I use a piece of soft rubber infusion tubing with a safety pin in one end to prevent the tube's insertion for too great a distance. With this nasopharyngeal airway in place, assistance of respiration is mandatory and the substitution of the more adequate

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oropharyngeal airway should be made as soon as possible. Even though the geriatric patient is not edentulous, we must always check for bridges or loose teeth. The improper handling of the dental structures—both natural and artificial — probably is the major source of legal action against anesthetists.

The bony changes seen in the old patient are of interest to us. The arthritic neck may cause us a great deal of difficulty. If an arthritic neck is noted and it is impossible to extend the patient's head, it may be advisable to intubate the patient while he is awake. Calcium deposits in the ligament of the lumbar area often make spinal tap very difficult. In addition, bony changes in the lumbar vertebrae make the matter of positioning a patient for spinal tap of utmost importance. The often used phrase, "Stick your back out like a mad cat," to the patient who is lying on his side in a strange operating room is poor instruction. The patient rarely is able to assume the position you desire. After placing the patient in the lateral position, it is much more effective to place one hand in the bend of the patient's knees and the other hand behind his head, gently exerting pressure at these two points, instruct the patient to either "Curl up like a ball," or in this part of the country, "Curl up like a shrimp," will be most instructive. Most unsuccessful attempts at spinal tap are due to poor positioning.

The cardiovascular system of the geriatric patient has withstood use for many years. Though not always, we often find pathologic changes in the cardiovascular system. Hypertrophy of the heart muscle is the commonest pathologic condition seen in the cardiovascular system of the geriatric patients. This abnormality by itself is not usually considered to be serious; however, when we find that cardiac hypertrophy exists, it is important that we check carefully that o t h e r associated pathologic changes such as congestive failure, hypertension, etc., are not present. The cardiovascular system of most geriatric patients is adequate, but it is most important to avoid any insult to this system in the form of overdosage, anoxia, sudden shifts of position, etc.

The respiratory system of the elderly individual may be beset by any of the diseases which occur in the younger patient. Pulmonary fibrosis and emphysema occur commonly in the geriatric patient. Fibrosis of the lung reduces not only the total alveolar area but also the total capillary bed. As a result, oxygenation and elimination of carbon dioxide are impaired. When emphysema is present, we see long, stormy inductions because the residual dead space of the lung is tremendously increased. As a result, the time required for the inhaled concentration of gases to reach an equilibrium with the concentration of lung gas is prolonged. In addition to this, increasing or lightening the depth of anesthesia requires more time.

It is not uncommon in the elderly individual to find impairment of the kidneys. Output of urine is often reduced; this fact is important to remember because most of our nonvolatile agents are handled in one way or another by the kidneys. As an example, the long acting barbiturate, phenobarbital, is excreted un-

changed by the kidneys. Though most of our non-volatile drugs are in some way altered by the liver, the usual common final pathway is via the kidneys. It is known that in the geriatric patient the adrenal gland does not function as actively as does the adrenal gland of the younger individual. The old individual is not able to respond to stress so actively or so efficiently as is the young individual. The reduction in cortical hormone output may account for the fact that we do not see marked reflex activity under anesthesia in the geriatric patient.

The digestive system of the geriatric patient is of little interest to us; however, there is one condition I would like to mention. We find, as an individual advances in years, the content of hydrochloric acid in the stomach is reduced. Hydrochloric acid is necessary for effective uptake of iron from the food. For this reason it is not uncommon in the old individual to find an iron deficiency anemia.

Premedication

The older a person becomes the less tolerant he is of drugs. For this reason it is important to consider the patient's age when deciding on the amount of drugs to be given for premedication. This is most important when we consider dosage of the opiate used for premedication. Barbiturates have not replaced the opiates as premedicant drugs. The two primary reasons for giving premedication are to obtain drying of salivary secretions and euphoria. Barbiturates do not produce euphoria. After an individual has reached the middle years of life, the dosage of the opiate should be reduced in accordance with his age. In addition to the opiates, the other group of drugs most popular as premedicants, is the belladonna alkaloid group. Until the patient has reached age 60, no less than 1/100 gr. (0.65 mgm.) atropine or Scopolamine should be used. After the age of 60 has been passed, 1/150 gr. (0.45 mgm.) of atropine is recommended. Scopolamine is not recommended for the patient who is in the seventh or eighth decade because the patient sometimes experiences hallucinations after its use. Premedication should be given 60 to 90 minutes before the contemplated time of surgery. In the event that overdosage from the narcotic occurs, either nalorphine (Nalline)® or levallorphan (Lorfan)® are effective in reversing the depression from narcotic over-dosage.

New Approaches

Since the early 1930's anesthetists have become increasingly bolder in their use of cyclopropane. Should cyclopropane be used in the face of cardiac disease? This is a very complex problem, but briefly, I feel that cyclopropane is the drug of choice for induction of anesthesia in the cardiac patient in the absence of conduction defects. When conduction defects are present I feel that a barbiturate induction, followed by ethylene-ether sequence, is still the method of choice. When cyclopropane is used for the cardiac patient it should be used only for induction. As little cyclopropane as possible should be used and the anesthesia should be converted to ether as quickly as possible. If the ethylene-ether (or nitrous oxide-ether) sequence is selected as the method of choice and anoxic problems are en-

countered after the beginning of the induction, a conversion to cyclopropane-ether sequence is indicated. It is hard to conceive of light cyclopropane anesthesia being more detrimental to the cardiac patient than anoxia.

I would like to mention a new drug called fluothane. Fluothane is a halogenated hydrocarbon which is not flammable. I would suggest to all of you, that you watch the literature and read everything you can about this new drug, for I feel that it will very probably have a place in our armamentarium of drugs. Fluothane is the most potent volatile anesthetic known; therefore, the control of depth of anesthesia with it is tedious. Best results with it have been obtained by using a special vaporizer for fluothane's vaporization to fortify high flows of nitrous oxide and oxygen. At the present time I do not recommend the use of fluothane in the geriatric individual, for there is evidence to suggest that there is some reduction in cardiac output. Until further investigational work has been done along this line, I feel that the use of fluothane should be confined to the younger patient.

There is much talk today, both pro and con, regarding the automatic breathing machine. In theory such machines produce a more physiologic state for the apneic patient than does the intermittent manual compression of the breathing bag. This is probably true, provided the machines are in perfect working order. Some of the models have so many moving parts that it is almost impossible to get all of them working at one time. The use of most of these machines requires that the patient be apneic. This often requires a large dose of muscle relaxant which is not without danger; further, apnea deprives the anesthetist of one of his most valuable guides to the status of the patient. It may be that I have not used the automatic breathing devices enough to appreciate them, but to date I am not a convert to their use.

Psychological Preparation of the Child for Anesthesia

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The title of this paper, of course, refers to the mental preparation of the patient for his anesthetic and operation. Since ear, nose and throat operations are largely concerned with children, I believe most of my remarks should point up the psychological preparation of the child for anesthesia. Tonsillectomies and adenoidectomies are elective procedures which means that there is adequate time for a few small ideas to be implanted in the active and fertile minds of the children. You might say this is a mild mental conditioning of the little patient for what is to follow.

When we think about this problem we soon realize that for most children this could be a very disturbing psychological experience. This c h i l d never has been away from home, separated from his f a m i l y and friends, and to top this off he will have a painful nauseating experience during which some total stranger will clap a mask over his face, hold him down, and make him breathe an odd-smelling, irritating, choking mixture. All this occurs on a day when no one gives him his breakfast, not even a sip of cold water. Of course, all this is forgotten because when he wakes up he will be so nauseated and his throat so painful that he will be too sick and occupied to think back on preceding events.

Most children are naturally friendly and unprejudiced, facing each new day with a shiny face and an open mind. This natural freshness of a child's mind, his trust, utter naiveness and enthusiasm for each new experience act as a natural psychological defense and buffer mechanism. Children are easily hurt but are quick to heal and to forget.

What are the actual steps taken to counteract this possible trauma? The little patient should be acquainted with his doctor who has examined him in his office, who is friendly and has given him some idea of what to expect in the hospital. This brief account of what will occur in the hospital runs about like this. He will be in a room with other children there for the same procedure, he will get a ride on a carrier the next morning, he will be seeing his doctor in the operating room, also a nice lady anesthetist who will give him something to smell which will put him to sleep. When he awakens after his operation he will be in his hospital bed (this is important) and his

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mother will be right there beside him. I do not believe a long detailed account of what to expect is necessary or wise—just the bare essentials and certainly no information which might be frightening.

Let us assume the child is in the hospital now, trailing his favorite bedtime sleeping toy. Let me say, first of all, these little patients are better off in the children's ward with o t h e r children — not in a private room. Mob psychology we call it. In a ward there are too many things going on to allow the child time to worry about himself. There is television for him to watch and other kids with whom to talk. His nurses are friendly and soon call him by name. There is nothing more important than good pediatric nurses.

We do everything possible for his comfort. A long time ago we discarded the enema. We are not concerned with the state of his intestinal tract unless there is some gross abnormality and we trust the child's mother to tell us if there is.

His doctor visits him in the hospital the afternoon before his operation and renews their acquaintance. At Shadyside Hospital [Pittsburgh, Pennsylvania] the l i t t l e patient comes to the hospital in the afternoon before the operation and stays until the morning after.

The morning of the operation he receives a hypodermic of atropine and codeine (dosage according to weight and height). He is allowed to wear his own underpants; this affords a small measure of security—put yourself in his place! Everyone says goodbye when he leaves the ward. When he gets to the operating room all diverting and soothing influences are brought to bear. If there is a waiting interval he receives a box of toys to busy him. His anesthetist says "Hello" and makes small talk with him. This is the most important time of his mental preparation. The friendly quieting conversation about his brothers and sisters, pets, school chums, favorite toys—anything discussed while he is being wheeled to the operating room is important. Once he is on the table some simple explanation about the mask, drops, and rubber goggles is made—maybe he tries on the goggles — a story is told, and more often than not the child is soon asleep without much disturbance. The anesthetist with a friendly "gift of gab" is indispensable.

If these kids are not to suffer psychological disturbances, it is up to you. I know you don't have much t i m e — maybe five minutes at the most. There is an operating room schedule to be eternally hurried through, the surgeon may be giving you that look over the top of his glasses — and you know what he is thinking.

In this brief five minutes all you have to do is:

1. Make fast friends with the child;
2. Find out all about his family, dog, chums, favorite toys, teacher;
3. Be a mother and father simultaneously;
4. Bolster his courage;
5. Show him a mask, let him play with it—try it on—talk him into believing the ether doesn't smell so bad and that he can easily blow it away.

Anyway, we Americans are a tough lot and the children are wonderful—God bless them. If they can survive the physical and mental trauma to which they are subjected daily by their older brothers and sisters, not to mention the kid next door, what psychic harm can a little anesthetic and operation do?

I can truthfully say that in my experience other than the brief mild disturbance experienced by some 25 per cent of the children, manifested chiefly by nightmares, as evidenced by crying out at night, the remaining 75 per cent do very well. The treatment for the nightmares is TLC—tender loving care — and motherly comfort. These nightmares go on for about a week. Some of the children show a temporary antagonism toward the operating surgeon. We have seen no cases of frank postoperative anesthetic psychological disturbance which persisted and needed treatment. The so-called nightmares (screaming out at night) probably are caused by swallowing during sleep with resultant pain and awakening.

We prepare the little patient as best we can. Friendliness is our best weapon — plus a very fine group of anesthetists. Let's not be too concerned with the psychological disturbance of our little patient but rather concern ourselves with doing a good job quickly, in a friendly quiet manner, keeping this thought in the back of our minds.

"By Gosh! This kid's going to be a lot healthier after he gets these grubby tonsils out."

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Notes and Case Reports

Infant Resuscitation and Tracheal Toilet

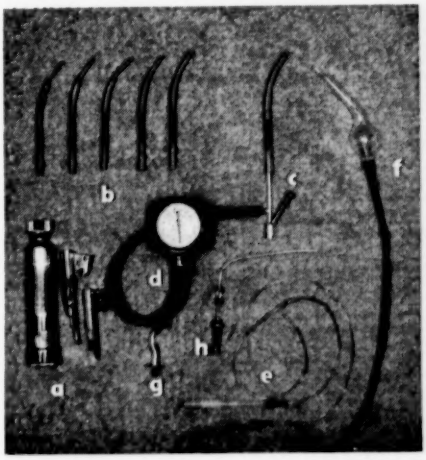
A discussion follows of the technique and equipment used when extensive oxygen therapy, resuscitation and tracheal toilet seem necessary clinically for certain newborn. These selected infants may include, for example, babies who have been in distress in the mother's uterus and possibly have inhaled amniotic fluid, laden with meconium, vernix caseosa, lanugo, or blood, and babies traumatized by long difficult labor or the use of instruments in delivery. Also, babies with respiratory depression from over sedation and anesthesia of the mother, could be included along with anoxia from abruptio placentae, prolapsed cord, atelectasis, congenital malformation or immaturity. These and other examples may result in an infant being born with foreign material in its respiratory tract, anoxia, and loss of muscle tone, abnormal pulmonary ventilation, or complete apnea.

When a new born baby presents this picture, an obstetrical staff member clamps and divides the umbilical cord, aspirates mucus fluid from the mouth and nostrils with a rubber bulb syringe to prevent aspiration of this material. The baby is immediately transferred to the receiving area where a reduced metered source of oxygen and electrical suction is available. The baby is placed in a 15 degree head down position to facilitate pulmonary drainage and to assure adequate blood volume for the more important structures: heart, lungs, brain, liver, kidneys, and adrenal glands. A direct laryngoscopy is performed and an endotracheal tube is placed one centimeter through the larynx into the trachea. A tube delivering oxygen 4 to 6 liters per minute is placed on the long lateral arm of the special endotracheal tube adapter. A blood pressure manometer is attached by a short length of tubing to the short lateral arm of this same adapter. While stabilizing the endotracheal tube and the infant's head with the left hand, the operator's right thumb is placed over the open end of the adapter for 0.2 seconds. Oxygen is forced into the lungs causing the chest to expand. The amount of pressure necessary to do this will be registered on the blood pressure manometer, which should be noted. When the thumb is removed passive expiration will occur. After one second chest inflation may be repeated. When oxygenation of the lung has been obtained, a catheter is placed down through the adapter tracheal tube into the trachea, and using electric power suction, foreign material is removed. The suction catheter is then removed and artificial ventilation is carried out with oxygen in the described manner until the tissues are oxygenated and spontaneous respiration is established. The suction catheter is again passed into the tra-

chea and is left trailing out as the endotracheal tube is slowly removed, so as to remove any material that may be trapped between the endotracheal tube and trachea. The mouth and nostrils are aspirated and an airway is inserted if necessary. The stomach is emptied by passing a catheter into the stomach and using a mouth suction and a De Lee mucous trap. This will prevent regurgitation and aspiration of irritating gastric contents into the lower air passages as well as give the diaphragm more room to function. It is very important to do this. If the infant still has poor color, respiratory distress or sternal retractions with the possibility of more foreign material in the tracheobronchial tree, another direct laryngoscopy is performed. The trachea and larynx are aspirated, using an angle nasal suction covered with polyethylene tubing extending longer than the tip. This may help clear the air way, improve the pulmonary ventilation and possibly help to prevent a meconium pneumonitis.

When the emergency situation is passed the baby is transported to the premature nursery for close observation, where the temperature, humidity and oxygen concentration can easily be controlled.

The equipment in the described technique is designated by a letter in the accompanying photograph and will be discussed individually. The laryngoscope battery handle (a) is Foreggers, medium sized. It uses C batteries that have long life. It is comfortable to use and is in geometric proportion to the other equipment. The laryngoscope blades (a) are Foreggers, infants and premature infants. They may be hooked on the battery handle (a) making a laryngoscope suitable for any newborn infant. The size of the infant determines the blade used. The endotracheal tubes (b) are Foreggers Cole endotracheal tubes for infants in sizes 8, 10, 12, 14, 16, and 18 French. These non porous plastic tubes are narrowed to size at the distal end and widen to fit the endotracheal tube adapter. This should help prevent endotracheal placement of the tube too far into the trachea.



a. laryngoscope
b. Cole endotracheal tubes
c. special endotracheal tube adapter
d. blood pressure Manometer
e. suction catheters
f. DeLee mouth suction trap
g. air way
h. angled nasal suction tip

For most infants the Fr. 14 is suitable. Small infants and prematures require smaller tubes and for very large babies the Fr. 16 or 18 is necessary. Using an endotracheal tube of proper size is very important. If intubation is attempted with an endotracheal tube that is too large, intubation may be difficult or impossible, requiring more time than is allowed,

as well as damaging delicate tissues. On the other hand, if too small an endotracheal tube is used oxygen will escape between the trachea and endotracheal tube, preventing artificial ventilation by not allowing enough pressure to build up in the intrapulmonary space. This special metal endotracheal tube adapter (c) that is attached to an endotracheal tube in the picture was manufactured for us by Foreggers and Co. This straight stemmed, one piece endotracheal tube adapter develops a slight negative pressure when oxygen at 8 liters per minute is delivered. This positively prevents resistance to the passive expiratory phase of respiration. There is a small lateral arm opening into the stem to which a blood pressure manometer (d) connected with a 14 inch length of Becton Dickinson blood pressure tubing is attached to note the pressure exerted on the infant's lungs.

The suction catheters (e) are used to aspirate the trachea while the endotracheal tube is still in place and are Pharmaseal K 31 and K 32 infant feeding tubes. They are soft and won't damage tissue. Pharmaseal K 32, premature infant feeding tube is easier to pass through the smaller endotracheal tubes. Pharmaseal # 351 Plastic Sims connector is used to connect the suction catheter with the large suction hose. This connector decreases the hazards of glass connectors in regard to breakage, and injury to patient and personnel.

The airway (g) is Foreggers (Waters) nippled, oral pharangeal airway #0. Its size is suitable for most babies. Oxygen may be insufflated into it, giving oxygen concentrations comparable to the nasal catheter insufflation method. The DeLee mouth suction trap (f) attached to a new French 16 whistle tipped urethral catheter is used to empty the stomach. The metal angle nasal suction tip (h) size 0 is covered with intramedic polyethylene tubing size # PE 280 which extends 6 centimeters past the end of the tip. This is used to aspirate the material from the larynx and trachea for babies who are ventilating. After using this equipment, it is washed with soap and water except the laryngoscope battery handle and blood pressure manometer, then thoroughly rinsed and soaked in a solution of Zephirian chloride 1;1000 for 20 minutes, rinsed in sterile water, then placed in an autoclaved covered stainless steel basin 9″ x 5″ x 2″. The blood pressure manometer and laryngoscope battery handle are wiped with a cloth, saturated with 70% alcohol. This equipment is stored in one of the obstetrical gas anesthesia machines to be immediately available.

There should be no hesitation in securing specialists such as Pediatricians, Radiologists, Otolaryngologists, and Surgeons to help diagnose pathology involving the respiratory system such as agenesis of the diaphragm; viscera in the thorax; tracheoesophageal fistula and pneumothorax atelectasis. Necessary treatment such as bronchoscopy, tracheotomy, thoracotomy and repair of a severe congenital defect as well as good pediatric medicine, including extensive inhalation therapy, should not be denied these infants.

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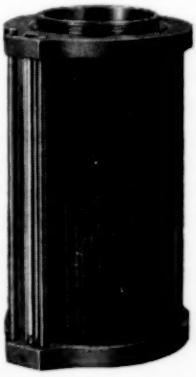

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Responsibility of Surgeon for Sponge Count Held Question for Jury

Doctor Cheeseman was a staff physician at the hospital and staff physician on plaintiff's case and as such he was the active physician on the visiting or voting staff who supervised the work of residents and internes in the care of patients and who participated in teaching the residents and internes; plaintiff, as were most of the patients, was a charity patient cleared through a welfare agency and Doctor Cheeseman received no pay for his services; a resident is a trainee, not a qualified specialist, but he would be specializing in his field; Doctor Weaver was a resident in surgery, was associated with and assisted Doctor Cheeseman, a qualified specialist in surgery, in the operation on plaintiff; Doctor Weaver was a resident, he was paid for his services from tax money and it was quite probable that he took the lead in the operation because he was far enough along in his training to have been entrusted therewith; the staff man stood over the resident when the resident was permitted to operate; Doctor Weaver was not the surgeon in charge, he was the assistant, although he may have actually done the operating; regardless of a resident's training, the staff member to whom he is assigned is supposed to be present at anything as serious as a gall bladder operation. Doctor Weaver was graduated in June, 1955.

Plaintiff testified that Doctor Cheeseman conversed with her the previous November about the operation and about two or three days before the operation Doctor Weaver and Doctor Cheeseman examined her in the hospital; Doctor Weaver and Doctor Cheeseman were both with her when she was wheeled into the operating room and Doctor Cheeseman had on operating clothes and a mask; throughout plaintiff's stay in the hospital she suffered severe pain and pressure at one end of the incision and she had complained of this to the internes and to Doctor Cheeseman; on December 17, 1954, she had a second operation by Doctor Pollock, whose deposition shows that X-rays had disclosed an opaque mass in the abdomen and the operation had revealed a surgical tape (a pad of gauze) twelve inches square. It is not customary to find such a situation long after surgery.

Doctor Marvin Roberts, another resident, testified he was first assistant, Doctor Cheeseman was second assistant, and Doctor Weaver was the surgeon in charge of the operation. The duty of the first and second assistants is to provide exposure in the operating field — to provide an opening by hands or re-

tractors through which the operating surgeon can see the area of the operation.

There was testimony from the witnesses that the nurses, as was the custom, counted the sponges before the operation commenced and a tabulation was made. Before the body cavity was closed the nurses made another count and if it was the same as before, they notified the surgeon to that effect and the opening was closed. "The failure of a surgeon to remove a surgical sponge or other foreign object from the body of a patient following the use of such an object during the course of an open operation constitutes one of those occasions where, by reason of the very nature of the omission, a majority of the courts, although recognizing its general application, have expressly or impliedly refused to apply the otherwise well-established rule that negligence of a physician will not be inferred or presumed because of an adverse result of medical treatment."

"We will pause here," said the Court, "to note the evidence and contention, or attempt of defendant to relieve Doctor Cheeseman of liability by showing that the nurses kept the sponge count. This seems to avail him little, if anything, because the sponge was found at the point of the operation and there was nothing in the record to dispute this fact. It remains a question of fact for the jury to decide. In other words, a count of sponges by a nurse before and after an operation is not conclusive.

"From the record and the authorities, it appears that plaintiff had the right to have Doctor Cheeseman's acts submitted to the jury for its determination as to whether his acts constituted negligence and were the proximate cause of plaintiff's injury or resulting damage, and whether his was a primary liability. The judgment cannot stand for the reasons stated and it must be reversed and the case remanded with instructions that the trial court grant a new trial and proceed therewith in accordance with this opinion."

(Rule v. Cheeseman, 7 CCH Neg. Cases 2d 969-Kans.)

Court Affirms Judgment for Patient Falling Out of Bed Due to Lack of Side Boards

Roy H. Carlburg, sued the Wesley Hospital and Nurse Training School, for damages for personal injuries sustained by him while a patient in the hospital.

Carlburg was a patient in the hospital for a series of operations. After the second operation and while still under the influence of an anesthetic, Carlburg was moved from the recovery room to a room which he was to occupy as a patient. Shortly afterward he fell out of bed sustaining severe injuries.

In his petition he alleged that the hospital, its employees and attending nurses, neglected to place the side boards on the bed in an upright position to protect and prevent him from falling out of bed.

The case was tried to a jury which returned a verdict of $41,259.17 in favor of Carlburg.

Generally speaking, when an accident is caused by negligence there is no room for application of the doctrine of "unavoidable accident", even though the accident may have been

"inevitable" or "unavoidable" at the time of its occurrence, and one is not entitled to the protection of the doctrine if his negligence has created, brought about, or failed to remedy a dangerous condition resulting in a situation where the accident is thus "inevitable" or "unavoidable" at the time of its occurrence. In other words, a person is liable for the combined consequences of an "inevitable" or "unavoidable" accident and his own negligence.

The facts of the accident in the case at bar do not bring it within the doctrine of "unavoidable accident". The term "unavoidable accident" excludes and repels the idea of negligence. It is an occurrence which is not contributed to by the negligent act of omission by either party. The term is synonymous with "mere accident" or "pure accident". These terms imply that the accident was caused by some unforeseen and unavoidable event over which neither party had control. (Know v. Barnard, supra; Schmid v. Eslick, supra.) Carlburg, who at the time of the accident was in at least a semiconscious condition, was under the complete control of the hospital, its employees and attendants. There was nothing unavoidable about this accident. Either the hospital was negligent in its duty to Carlburg or it was not and the court so instructed the jury.

The extent and character of the care that a hospital owes its patients depends on the circumstances of each particular case. A private hospital owes its patients the duty of protection, and must exercise such reasonable care toward a patient as his known condition may require. The measure of duty of a hospital is to exercise that degree of care, skill and diligence used by hospitals generally in that community, and required by the express or implied contract of the undertaking.

A hospital is not an insurer of a patient's safety, and the rules as to the care required are limited by the rule that no one is required to guard against or take measures to avert that which a reasonable person would not anticipate as likely to happen.

"We have examined the record and are satisfied that the evidence sustains the award of damages made by the jury.

"The judgment is affirmed."

(Carlburg v. Wesley Hospital and Nurse Training School, 8 CCH. Neg. Cases 2d 31-Kan.)

Hospital Negligent in Failing to Provide "Call Button" for Patient Who Fell Getting Out of Bed

Gertie Belisle and her husband, J. W. Belisle, filed suit against Dr. Loys C. Wilson, doing business as the Presnell Hospital and obtained judgment totaling $8,000. By the petition, which was in one count, Mrs. Belisle sought damages for personal injuries received when she fell out of a bed in the hospital where she was a patient, and J. W. Belisle sought damages for medical expenses and loss of services of his wife. No objection was made to the form of the petition.

Dr. Wilson is the sole owner of the Presnell Hospital located at Kennett, Missouri, which is a private hospital operated for profit. On March 24, 1956, Gertie Belisle, then 60 years old, was admitted to the hospital as a patient of Dr. James Fuzzell. She was not then and had never been a

patient of Dr. Wilson. The tentative diagnosis of Dr. Fuzzell was osteoarthritis of the left hip with the possibility of cancer. There were no orders for any special nursing care.

Mrs. Belisle walked into the hospital and to the room assigned to her which was located on the second floor of the building. She also walked from her room to the elevator, and after being taken to the basement, walked to the therapy room. She returned to her room in the same manner. The bathroom was located across the hall from her room, and she got up from her bed and walked to and from the bathroom whenever necessary.

On Sunday evening, March 25, pursuant to her doctor's orders Mrs. Belisle was given a laxative and a "sleeping capsule" by the nurse's aide then on duty. Mrs. Belisle testified that the laxative consisted of "cascara and milk of magnesia," but the person who administered it stated that it was a "dose" of "milk of magnesia."

Mrs. Belisle was the only occupant of "semi-private room." Although this was the principal disputed factual issue, there was substantial evidence from which the jury could find that there was no "call button" with which Mrs. Belisle could summon the nurse or other person whose duty it was to tend to her needs as a patient. The room was equipped for such a device, and there was a receptacle located in the wall near the bed, but Mrs. Belisle and the witnesses for plaintiffs testified that there was no "signal cord" plugged into this receptacle. Defendant's evidence was to the effect that the call button was properly inserted in the receptacle at all times. The room was also equipped with a ceiling light which was operated by a switch located near the door and which could not be reached by Mrs. Belisle from her bed. There was also a floor lamp located near the head of the bed, but she testified unequivocally that she could not reach this lamp. A nurse's aid testified that on Sunday night she adjusted this lamp for Mrs. Belisle to use in reading, and that she moved it next to the bed so that Mrs. Belisle could turn it on or off.

Mrs. Belisle awakened about three or three-thirty o'clock Monday morning. The room was then "dark" and, in her words, "I woke up in the morning, and felt like my kidneys wanted to act, and I seen that I had had a bowel movement, and I started to get up and fell out of bed." She further testified that when she fell she "was trying to get up," and that "well, I just started to get up and I missed that stool" that was at the side of the bed. As a result of the fall Mrs. Belisle sustained a fractured hip. Two attendants of the hospital were in the hall "at the desk." They heard the sound of Mrs. Belisle falling and went immediately to her aid.

The court said the jury was justified in finding the hospital was negligent in failing to provide a "call bell" to enable the patient to summon aid. "We find no prejudicial error in the matters complained of by appellant on this appeal. Therefore, the judgment is affirmed."

(Belise v. Wilson, 8CCH Neg. Cases 2d 42 - Mo.)

Obstetrician Held not Liable for Failure to Diagnose Pregnancy of Patient

The plaintiff, Rose Crovella, had her last menstrual period between

December 1, 1954 and December 4, 1954. She was seen by a general practitioner on five occasions. This practitioner diagnosed her pregnancy on February 9, 1955. When plaintiff last visited him on April 20, 1955, he indicated that something was wrong with the development of the fetus. He stated that a Caesarean section might be required and that he would call in a specialist at the last minute if necessary. Plaintiff went to defendant, an obstetrician, on April 27, and told him that she was pregnant but that the pregnancy was not advancing as it should. Defendant examined her on this occasion and on May 13. He employed the "frog test" to determine if she was pregnant and found a negative showing. Defendant told plaintiff that from his findings, he thought that she was not pregnant. He gave her some pills and told her that she could go back to her job as a waitress. She did so, and on June 20, 1955, suffered a violent vaginal hemorrhage, discharging much blood and several pieces of matter. The pieces of matter were not definitely identified as parts of a fetus. Plaintiff was taken to a hospital where a third physician, a surgeon, performed a dilation and curettement in the course of which he removed pieces of a placenta. This surgeon expressed the opinion that plaintiff had had a miscarriage and that the "frog test" was of little weight in the light of her prior history.

Plaintiff and her husband instituted action against defendant to recover for personal injuries charging malpractice. The lower court entered a summary judgment for defendant. Plaintiff appealed, contending among other things that the lower court had erred in entering summary judgment on the facts presented. The affidavits of plaintiffs' medical witnesses and the other evidence offered failed to make out a prima facie showing of defendant's negligence. This court affirmed the judgment.

(Crovella v. Cochrane, 8 CCH. Neg. Cases 2d 239 - Fla.)

Book Reviews

Tracheotomy: A Clinical and Experimental Study. By Thomas G. Nelson, Major, M.C., U.S.A.R. Baltimore: Williams & Wilkins Company, Cloth. 111 pages. 1958.

With a concise summary a brief introduction and a brief history, the main portion of the book is based on clinical experience and experimental studies. With 300 tracheotomies as the basis for the clinical study, much of interest to the anesthetist will be found in this portion of the book. Indications for tracheotomy, technical variations for the procedure, complications and the advantages are all phases that will help in understanding of the operation in relation to anesthesia. With an increasing use of tracheotomy, both elective and emergency, more need for knowledge on the subject will become apparent. 47 illustrations.

Anatomies of Pain. By K. D. Keele, M.D., F.R.C.P., Consultant Physician, Ashford Hospital and Staines Hospital. Springfield, Illinois: Charles C Thomas. Cloth. 206 pages. 1957.

To those whose lives are dedicated to the relief of pain, this book will be of special interest. The author has traced through history the continuous interest in and concepts of pain, its causes and its treatment. It is the author's hope "that present-day workers on Pain will find in these Anatomies of Pain a useful background to the problem, and possibly some still fertile seeds from the past worthy of germination." Illustrated.

Introduction to Anesthesia. The Principles of Safe Practice. By Robert D. Dripps, M.D., Professor and Chairman, Department of Anesthesiology, Schools of Medicine, University of Pennsylvania; Anesthetist, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania; James E. Eckenhoff, M.D., Professor of Anesthesiology, Schools of Medicine, University of Pennsylvania; Anesthetist, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania, and Vandam, Leroy D., M.D., Clinical Professor of Anesthesia, Harvard Medical School; Director of Anesthesia, Peter Bent Brigham Hospital, Boston, Massachusetts. Philadelphia and London, W. B. Saunders Company. 1957.

This book presents the subject of anesthesia as it evolved in the Department of Anesthesiology of the Hospital of the University of Pennsylvania.

It will be of particular interest to persons in the teaching field as well as to practicing anesthetists.

Developed after years of teaching, the plan for the book starts with the preanesthetic period, the day of anesthesia, the time of actual operation, and the postoperative period. A sixth section on special topics includes chapters on cardiac resuscitation, anesthesia for children, for ambulatory patients, for obstetrics, narcotic poisoning, inhalation therapy, and death reports. The concluding chapter of this section presents a philosophy for teaching that is a fitting climax to this valuable text. 47 illustrations, indexed.

THE PHYSICIAN'S OWN LIBRARY. By Mary Louise Marshall, Librarian, Rudolph Matas Medical Library, Tulane University; Assistant, Orleans Parish Medical Society Library, New Orleans, Louisiana. Springfield, Illinois: Charles C Thomas. Cloth. 87 pages. 1957.

Although the title would seem to limit the use of this monograph to physicians, its content can readily be adapted for use by others who wish to build a library.

Not restricted to the selection of books, this volume has chapters on facets of the care, preparation, indexing and collection of reading materials that will delight the professional book-lover and stimulate the casual reader. Many references and an index enhance the text.

ANAESTHESIA FOR NURSES. By Eric Godwin, L.R.C.P., M.R.C.S., F.F.A., R.C.S.; Consultant Anaesthetist to the Croydon Group of Hospitals. Baltimore: Williams & Wilkins Company, exclusive U. S. agents. Linen. 98 pages. 1957.

This small, linen covered book contains much useful information about anesthesia as it relates to nurses and midwives. Emphasis is placed on phases of anesthesia that will help the nurse in the care of patients and in aiding the anesthetist. The chapter on complications and postoperative care has many points that must be re-emphasized if complications are to be prevented. A very short chapter on the control of poisonous substances in the operating rooms presents a subject too often overlooked in teaching young nurses. Anesthetists will find this book helpful in preparation of lectures for student nurses.

PERSONAL, IMPERSONAL, AND INTERPERSONAL RELATIONS. A GUIDE FOR NURSES. By Genevieve Burton, R.N., Ed. D.; Lecturer, School of Nursing, University of Pennsylvania; Associate, Division of Family Study, Department of Psychiatry, School of Medicine, University of Pennsylvania. New York: Springer Publishing Company, Inc. Linen. 230 pages. 1958.

Frequently utilizing the illustrative case, the author has succeeded in presenting the subject of human relations in a most readable manner. Designed for the young nurse, the book has much material that will be of value to all nurses. Better understanding of self, co-workers and patients are the goals which have been set down by the author. A receptive reader will enjoy discovering how well the goals have been met. The dull gray soft linen cover detracts from the effect that the book merits.

RELIGIOUS DOCTRINE AND MEDICAL PRACTICE. A HANDBOOK FOR THE PHYSICIAN, NURSE, AND OTHER MEDICAL PERSONNEL. By Richard Thomas Barton, M.D., Associate Consultant, University of California. Springfield, Illinois: Charles C Thomas. Cloth. 94 pages. 1958.

To those who are working with patients, and who wish to respect the religious convictions of those patients, this book will be a most welcome addition to the library. Compactly presented are the beliefs of many faiths as they pertain to diet, to religious doctrine, to religious practices, to treatment and to attitudes. Brief historical introductions to each of the religions gives fuller understanding of the beliefs. The author has done a great service in making the facts in this book available to physicians and nurses.

Drugs and the Mind

by Robert S. de Ropp

Foreword by Dr. Nathan S. Kline

Not since the German toxicologist Louis Lewin wrote his famous work *Phantastica: Narcotic and Stimulating Drugs* in 1924 has there been an authoritative book for the general reader on all the drugs which affect the mind.

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THE CENTURY OF THE SURGEON. By Jurgen Thorwald. New York. Pantheon Books, Inc. Cloth. 432 pages. 1957.

This spellbinding novel is an authentic history of the development of surgery written for the interested layman. The author employs the narrative device of an eyewitness in telling his story of the 100 year advance in surgery. The appalling methods used before the discovery of anesthesia are introduced as the chronicle describes step by step the sometimes frightening adoption of the new technics.

This fascinating book will be of great interest to the anesthetist as an excellent medical history. A bibliography follows the text. Indexed.

BLOOD TRANSFUSION IN CLINICAL MEDICINE. By P. L. Mollison, M.D., M.R.C.P.; Director, Medical Research Council's Blood Transfusion Research Unit; Lecturer in the Department of Medicine, Postgraduate Medical School of London. Springfield, Illinois: Charles C Thomas. Cloth. 587 pages, illustrated. 1957.

The second edition of this valuable book follows the first edition by five years. The author has rearranged many parts of the book and has brought the data up to date. The table of contents lists many subheadings that will be of interest to anesthetists: Withdrawal of blood; survival of blood components after transfusion; blood volume; incompatibility and other unfavorable effects of transfusion and normal and abnormal blood findings in newborn infants.

Abstracts

Cohen, E. N.: Premedication for the obstetric patient. Postgrad. Med. 22: 485-488 (Nov.) 1957.

"Although infant mortality has been reduced by two-thirds during the past 40 years, there has been no equally significant reduction in deaths occurring during the first 24 hour period of life. Twenty-nine per cent of the entire first year's mortality occurs during this first 24 hour period. More than one-half of these deaths are related to problems of anoxia and abnormal pulmonary ventilation. . . .

"In spite of good psychologic preparation, the patient in labor who does not need analgesic drugs is the exception rather than the rule. . . . Of the two important belladonna derivatives, scopolamine has many considered advantages in obstetrics over atropine. . . . There are multiple advantages in the proper use of the barbiturates in obstetrics. . . . It has been suggested that there exists a maternal placental barrier for barbiturates. Experimentally, however, all the barbiturates can be traced through the placenta to the infant. . . .

"Morphine has been used for obstetric premedication for 60 years, but few clinicians now believe that it should be used past the first stage of labor, if at all. . . . Two specific narcotic antagonists, Nalline and Lorfan, developed within the past few years, have proved to be valuable additions to the armamentarium. These drugs may be given to the mother before delivery or intravenously injected directly into the umbilical vein of a depressed newborn infant. . . .

"The administration of curare in repository form with the first onset of active labor has been recommended in order to reduce analgesic needs, accelerate the labor process, and reduce the number of episiotomies. A recent study of 200 patients showed no significant advantages to use of repository curare for this purpose.

"Muscle relaxants have been given intravenously during the third stage of labor in order to reduce the need for episiotomy and to facilitate forceps delivery. This technic has proved helpful, and clinical and laboratory studies in humans have demonstrated the non-transmission of d-tubocurarine across the placental barrier. This property also permits the use of curare as an anesthetic aid during anesthesia for cesarean section. Laboratory evidence as to the transmission of other muscle relaxants across the placenta is conflicting, and at present we had best limit ourselves to using d-tubocurarine.

"Obstetric premedication is a complex problem which does not lend itself to a simple routine. No single drug or even group of drugs provides a satisfactory answer to pain relief. . . . When used in proper dosage and with due consideration for their effects, several drugs may be combined safely to provide the mother with adequate analgesia."

Lincoln, M. W.: Aspiration of gastric contents under anesthesia. A review and clinical study. California Med. 87: 403-407 (Dec.) 1957.

"The series studied was made up entirely of private patients who were anesthetized for surgical treatment of various conditions. All of the patients were anesthetized for variable periods (15 minutes to four hours) with so-called balanced anesthesia. Carmine red in gelatin capsules was given to the patient with an ounce of water 30 minutes before operation. Care was taken to obtain smooth induction, using Pentothal intravenously. Anesthesia was then maintained with nitrous oxide and small doses of thiopental (Pentothal) and/or meperidine (Demerol). Relaxants were used when needed for abdominal operations or to facilitate intubation. All patients having upper abdominal operations were intubated with a cuffed endotracheal tube and respirations were controlled during the major part of the procedure. . . . Respirations were assisted and/or controlled in all cases, and every effort was made to prevent inspiratory obstruction. Following are the observations in the first 50 cases in this series. They constitute only a preliminary report, for the study is still in progress.

"Regurgitation occurred in two cases — in both instances while the patient was 'bucking' on the endotracheal tube during light anesthesia. Considering the muscular components of 'bucking,' it is not surprising that regurgitation occurred, for in some respects it is similar to vomiting. An inflated cuff on the tube prevented aspiration of gastric contents in both cases. Aspiration did not occur in any case in the series.

"Although this series is not complete, the results thus far tend to indicate that by obtaining a smooth induction and preventing any respiratory obstruction the incidence of so-called 'silent regurgitation and aspiration' can be reduced. A facet of the study still in progress is to consider the advantages of tubes of various types as a means of blocking off the stomach from the esophagus in cases in which there may be gastric contents that might be regurgitated and aspirated."

Calvert, D. N., and Huston, M. J.: Effect of certain cardiovascular drugs on respiration of tissues in contact with oxygen. Arch. internat. de pharmacodyn. et de therap. 113: 45-52 (Dec.) 1957.

"This investigation was undertaken to examine the effect of ouabain, digitoxin, and quinidine on tissue respiration and to evaluate further this method as a pharmacologic tool by comparison with standard Warburg procedures. . . .

"The effect of ouabain, digitoxin and quinidine on the respiratory rate of heart and diaphragm of the guinea pig and rat and of guinea pig brain was investigated in KRP, in KM III and suspended on mats in oxygen (HM flasks). Ouabain caused: — a decrease in rat heart respiration in HM flasks, in rat diaphragm in HM flasks, and in guinea pig diaphragm in both liquid media and in HM flasks; an increase in guinea pig heart in HM flasks and in guinea pig brain in HM flasks.

"Digitoxin caused: — an increase in rat diaphragm respiration in KRP but not in the other media and no effect on rat heart, or guinea pig heart or diaphragm. Quinidine caused:—a decrease in rat heart res-

piration in KRP at two dose levels, a decrease in rat diaphragm at the higher dose in all three media but an increase in KRP at the lower dose; an increase in guinea pig heart in KM III but a decrease in guinea pig diaphragm in all three media except in KRP when the dose was by the intramuscular route."

Gruber, C. M., and Lonergan, L. H.: Cardiovascular changes seen in dogs under 'Methitural' anesthesia as influenced by sympathomimetic amines and other procedures. Arch. internat. de pharmacodyn. et de therap. 113: 27-44 (Dec.) 1957.

"This investigation was undertaken to determine the effect of 'Methitural' upon the cardiovascular system and cardiac rhythm when given slowly in anesthetic doses in dogs, and to determine if these responses can be altered by changes in blood pressure, by the administration of oxygen by inhalation, by sympathomimetic amines injected intravenously, by bleeding, by central nerve trunk stimulation, etc. Healthy mongrel dogs weighing between 10 and 32 kg were used in these experiments. . . .

"In dogs, the effect of Methitural on heart rate was so variable that no conclusions could be drawn. Cardiac arrhythmia was produced in 96 per cent of the animals. . . . In the 48 injections in which Methitural caused cardiac arrhythmia, the arterial blood pressure increased 47 times with an average increase of 26 mm Hg. In the 15 injections of Methitural which were not followed by arrhythmia the average blood pressure dropped 48 mm Hg. The isoproterenol sympathomimetic amines, in the doses used, changed the cardiac arrhythmia to normal rhythm in every instance. This change was not due to a fall in blood pressure since normal rhythm occurred before any blood pressure change. The restoration of normal rhythm appears to be due to a direct effect of the drug on cardiac muscle.

"L-nor-epinephrine, L-epinephrine, Adrenalin, and Orthoxine were fairly efficient in changing cardiac rhythm. All other sympathomimetic compounds had little or no effect on the arrhythmia of the heart. The administration of pure oxygen by tracheal insufflation had no striking influence on cardiac arrhythmia caused by Methitural. Hemorrhage, by lowering the blood pressure, changed the cardiac arrhythmia to normal rhythm. Re-injection of the blood to restore the blood pressure, caused the arrhythmia to return. If cardiac arrhythmia was present, small doses of Methitural rapidly injected, caused a fall in blood pressure, and the disappearance of the arrhythmia, which had been produced by a previous injection of Methitural.

"If cardiac arrhythmia was present, stimulation of the central cut end of the femoral, ulnar, anterior tibial or sciatic nerves restored normal rhythm if a fall in blood pressure accompanied the stimulation. If normal rhythm was present, carotid artery occlusion, stimulation of the central cut ends of the vagus and sciatic nerves produced cardiac arrhythmia if the blood pressure was simultaneously increased sufficiently.

"Cutting of the vagus nerves had no effect upon the production of cardiac arrhythmia. Amyl nitrite, histamine, quinidine, acetylcholine and stimulation of the peripheral end of the cut vagus nerve, all decreased the arterial blood pressure and changed cardiac arrhythmia to normal cardiac rhythm."

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Zimmerman, M. C.: Anesthesia and antisepsis with benzalkonium chloride (Zephiran) ice cubes. Arch. Dermat. 77: 122-123 (Jan.) 1958.

"Chilling the skin with an ice cube of 1:1000 aqueous benzalkonium chloride (Zephiran) gives quick, painless, superficial anesthesia plus antisepsis. No other steps are necessary prior to minor electrosurgery. . . . The painless onset of anesthesia without use of unfamiliar or frightening apparatus is particularly good for children. The ice cube also acts as a good psychological distraction for patients, young or old, giving the patient something to do, and to concentrate his attention on other than pain perception."

Kier, L. C., Whitehead, R. W., and White, W. C.: Blood and urine levels in glutethimide (Doriden) intoxication. J.A.M.A. 166: 1861-1862 (April 12) 1958.

"The widespread use of the popular nonbarbiturate sedative glutethimide (Doriden) has been accompanied by occasional reports of overdoses of this drug. Four fatal cases, allegedly due to poisoning by glutethimide, were documented for the first time by both autopsy reports and toxicological analysis. . . . In our experience with four nonfatal cases of glutethimide intoxication, both blood and urine levels were determined by the ultraviolet absorption method of Goldbaum and associates. . . .

"The ingestion of glutethimide is followed by a fairly constant and prolonged excretion (2 to 3 mg. per hour). . . . The blood level of glutethimide decreases slowly after ingestion. Narcosis is produced at blood levels of 2 to 3 mg. per 100 cc. or higher. Hemodialysis removes glutethimide at a more rapid rate (100 to 400 times) than does the normal kidney. Gastric lavage should be undertaken any time after ingestion of glutethimide. Other drugs depressant to the central nervous system such as alcohol and barbiturates react synergistically with glutethimide."

Tomskey, Gilbert, Bray, Kenneth and Adriani, John: The use of hypotensive anesthesia to control bleeding during nephrolithotomy. South. M. J. 51: 52-56 (Jan.) 1958.

"The excessive bleeding which is encountered at times during nephrolithotomy increases operative difficulties and leads to hemorrhagic shock. . . . Unless the operative field is dry the surgeon is handicapped in removing all calculi. . . . During the past few years surgical procedures complicated by excessive unavoidable bleeding have been facilitated by use of so-called controlled hypotensive anesthesia. . . .

"In general, the technic described by others in the management of hypotension for operations on malignant disease was used in this series of six cases. . . . Hypotension was deliberately induced with Arfonad. . . . The bloodless field provided by this procedure facilitated the operation and minimized blood loss. The use of the technic is justified in these patients because it facilitates the operation, reduced blood loss and decreases the amount of blood which must be replaced."

Ito, Iwao, Faulkner, W. R., and Kolff, W. J.: Metabolic acidosis and its correction in patients undergoing open-heart operation. Experimental basis and clinical results. Cleveland Clin. Quart. 24: 193-203 (Oct.) 1957.

"The occurrence of metabolic acidosis in patients undergoing open-heart operation has been recognized

by Lillehei and his associates. According to our observations, the most significant changes in blood pH occur not during, or immediately after operation, but about three hours postoperatively. As long as the patient is under anesthesia and his respiration is 'helped' by the anesthetist, an excess of CO_2 is blown off and the pH does not fall significantly. While the patient's circulation is being maintained by the heart-lung machine, the removal of CO_2 via the oxygenator also helps to keep the pH within normal limits. However, three or more hours after completion of the operation the blood pH occasionally falls to a level that is incompatible with life. Whatever the underlying cause, the mechanism of death in some cases seems to be an acidosis leading to respiratory failure followed by cardiac arrest. . . .

"The clinical results are based on 35 consecutive patients who underwent open-heart operation at the Cleveland Clinic while aided by a heart-lung machine. The types of artificial heart-lung used were the membrane oxygenator, the Melrose oxygenator, the Bjork oxygenator, and the modification of the Bjork oxygenator as described by Kay and associates. . . .

"This metabolic acidosis . . . was experimentally produced by restricting the cardiac output. Severe metabolic acidosis was prevented or corrected by slow intravenous administration of sodium bicarbonate during the postoperative course. Severe metabolic acidosis sometimes leading to respiratory arrest followed by cardiac arrest and death also occurs in surgical patients who have not been treated with the heart-lung machine but who have been subjected to a

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period of decreased circulation. It should be looked for more frequently, since the acidosis is a condition that can be controlled or corrected."

Gyermek, L., and Nador, K.: The pharmacology of p-biphenylmethyl-(dl-tropyl-a-tropinium)-bromide. Arch. internat. de pharmacodyn. et de therap. 113: 1-14 (Dec.) 1957.

"In 1950 we pointed out that the quaternary methyl derivatives of atropine and homatropine block not only parasympathetic nerve endings but also autonomic ganglia. On the basis of this finding we have dealt with the production and examination of a number of quaternary compounds of tropane structure in recent years. . . .

"In our preliminary studies we found the most suitable substance to be: p-biphenylmethyl-(dl-tropyl)-atropinium) bromide (N-399); after more detailed pharmacological investigation it was tested clinically under the name Gastropin. We now describe the pharmacological properties of this substance. . . .

"The peculiarity of this new tropane derivative is that as well as blocking the parasympathetic nerve endings it also blocks several autonomic synaptic functions. When it is compared with other anticholinergic substances it appears to unite optimally the parasympatholytic and ganglion-blocking properties. On the basis of these advantageous pharmacological results Gastropin has been clinically tested with success."

Burton, R. M., Sodd, Mary Ann and Goldin, A.: Some effects of lysergic acid diethylamide on barbiturate anesthesia. Arch. internat. de pharmacodyn. et de therap. 113: 83-88 (Dec.) 1957.

"During the course of studies on the mechanism of action of marsilid prolongation of anesthesia and while investigating the effects of lysergic acid diethylamide (LSD) on reserpine-sedated animals, it was observed that under certain conditions LSD could prolong the duration of barbiturate anesthesia in mice. . . . The mice used in these experiments were C57 Black males, 8 to 10 weeks old. . . .

"Lysergic acid diethylamide (LSD) has been found to prolong pentobarbital and hexobarbital anesthesia. 2-Bromo-d-lysergic acid diethylamide (BOL-148) did not extend the duration of anesthesia under the same conditions. Pentobarbital was shown to be a competitive inhibitor of LSD metabolism in vitro."

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NURSE ANESTHETIST: Salary $450.00 to $540.00 per month plus liberal fringe benefits. Case compensation for overtime. Easily make $750 per month. Apply Director of Anesthesia, Pontiac General Hospital, Pontiac, Michigan.

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NURSE ANESTHETIST for modern, 150-bed, fully approved, general hospital, located 50 miles south of Washington, D. C. Additional anesthetists needed to improve working conditions. Starting salary $475.00 per month. Reply: Administrator, Mary Washington Hospital, Fredericksburg, Virginia.

NURSE ANESTHETISTS: Modern 600 bed hospital, 30 miles from New York City, 40 hours a week, 30 days vacation, Pension plan plus Social Security. Salary controlled by Civil Service. For details apply: Director of Anesthesiology, Meadowbrook Hospital, Hempstead, L. I., New York.

NURSE ANESTHETIST: New 142 bed, air-conditioned, approved general hospital. College town 30,000 near Nashville. Pleasant work conditions, employee benefits. Guaranteed minimum, extra for call. Administrator, Memorial Hospital, Clarksville, Tennessee.

WANTED: Nurse Anesthetist. 173 bed hospital located in Midwestern University town of 130,000. Hospital fully accredited. School of Nursing. Building program contemplated. Meals. Starting salary $500.00. Call quarters on hospital premises. Write: Personnel Manager, Lincoln General Hospital, 2315 South 17th Street, Lincoln, Nebraska.

NURSE ANESTHETIST to complete staff of five for 260 adult bed hospital, expanding to 500 soon, located near business district, Akron, Ohio. Surgery and OB. No call except relief. Forty hour week, extra for overtime. Four weeks vacation after year. Base pay after boards $425.00, qualifications and experience govern salary offer. Apply: Administrator, St. Thomas Hospital, 440 North Main Street, Akron, Ohio.

NURSE ANESTHETISTS — Modern recently expanded 240 bed general hospital, new recovery room, busy surgical service, fully accredited hospital. Located in Piedmont section of North Carolina. Increasing Anesthesia Staff, several vacancies. Starting salary for graduates without previous experience $500.00 per month, registered experienced $550.00 per month, plus on-duty meal and laundry of uniforms. Limited number of accommodations at nominal fees. Apply to W. R. Peters, Director, High Point Memorial Hospital, High Point, North Carolina.

CHICAGO OPENING: Need Nurse Anesthetist to complete staff of seven in an approved 175 bed general hospital. All types of anesthesia. Salary $500 per month, 40 hour week, no week end call, 4 weeks paid vacation. Apply to Miss Arlene Randall, C.R.N.A., Director Anesthesia Department, Norwegian American Hospital, 1044 N. Francisco Avenue, Chicago 22, Illinois. Telephone: Brunswick 8-8800. During the Convention inquire at A.A.N.A. Booth 406 for details of interview appointments.

WANTED: Nurse Anesthetists, particularly interested in obstetrics. Salary open. Midwest. Apply: Carl C. Lamley, Executive Director, Stormont-Vail Hospital, Topeka, Kansas.

NURSE ANESTHETIST: $450 per month with experience for a 40-hour week, increments, paid overtime, six paid holidays, one month vacation, no nights except for relief, endotracheal experience required. All types of work except Pediatrics. Modern air-conditioned suites. Apply: William E. Montgomery, R.N., Chief Nurse Anesthetist, Akron General Hospital, Akron, Ohio.

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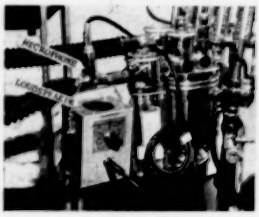

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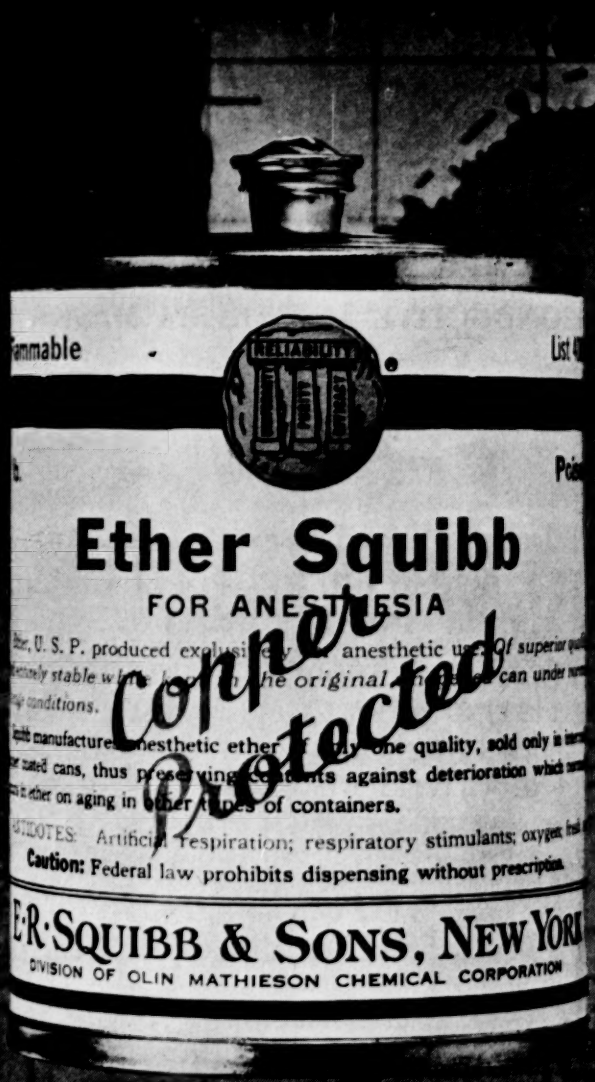
The TWENTY-NINTH QUALIFYING EXAMINATION for membership in the American Association of Nurse Anesthetists will be conducted on May 9, 1959. The deadline for accepting completed applications including the transcripts is March 30. Notice of eligibility will be mailed about April 6.

Applications should be forwarded early enough to allow time to request transcripts and have them returned to the Executive Office before the deadline date.

The TWENTY-EIGHTH QUALIFYING EXAMINATION for membership in the American Association of Nurse Anesthetists will be conducted on November 8, 1958. The deadline for accepting completed applications including the transcripts is October 1. Notice of eligibility will be mailed about October 8.

Applications should be forwarded early enough to allow time to request transcripts and have them returned to the Executive Office before the deadline date.



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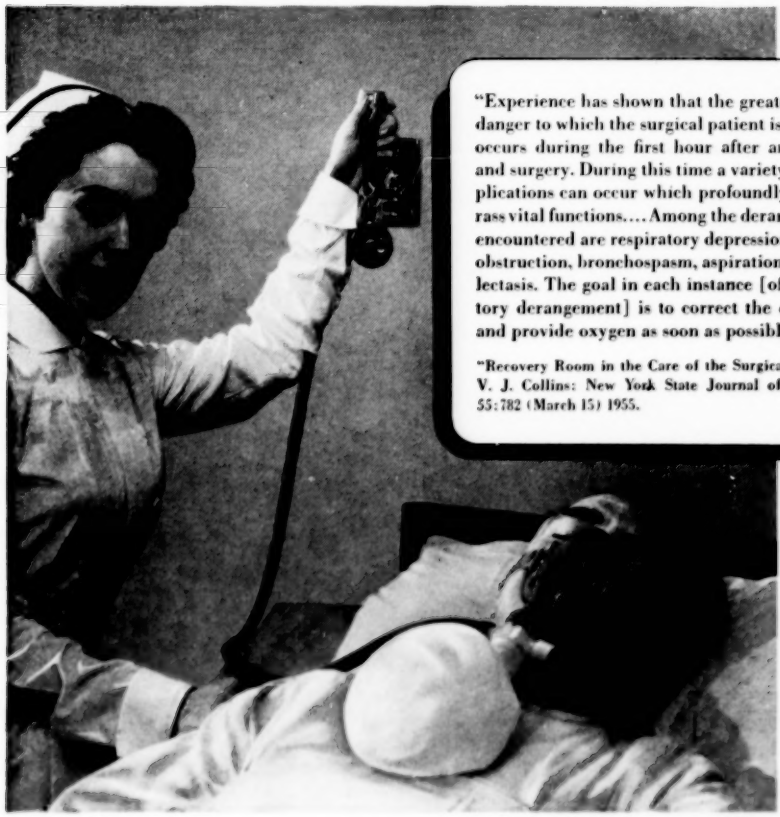

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"Recovery Room in the Care of the Surgical Patient," V. J. Collins: New York State Journal of Medicine 55:782 (March 15) 1955.

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